..THE IRON AGE..

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Hitch on the Big Horses

AMERICAN employers alone must shoulder the burden of carrying out the plans of the President as expressed in the Industrial Recovery Act. They have been asked to immediately raise wages and shorten hours but to defer raising prices to take up the increased labor costs. In addition, they are told that these increased costs should not be offset, at least for the time being, by the installation of labor-saving machinery.

In the metal-working industry, hard hit company surpluses have dwindled in many cases to the vanishing point. Profits have been almost universally non-existent for the past two years.

Many employers who would gladly raise wages immediately, because they believe they would eventually gain through the general increase of purchasing power and larger volumes, wonder where the money to do so is to come from. Bankers will not lend it to them and they are unable even to mortgage first class real estate.

If the R.F.C. can lend money to Russia to finance the purchase of American cotton, why should it not be permitted to lend money to reputable American employers to bridge the gap between wage increases and ensuing profits through increased volumes?

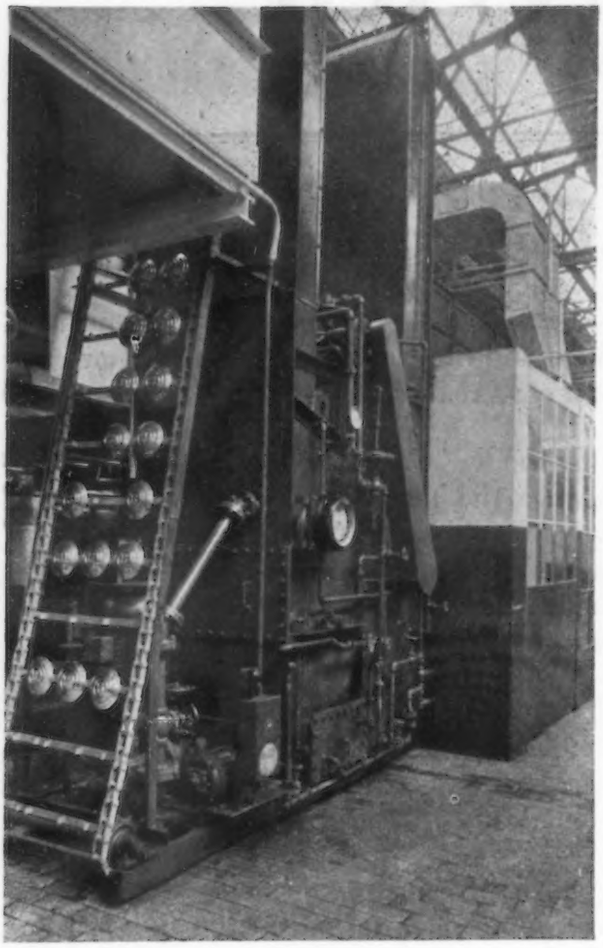
Credit boards, set up by trade associations, could advise the R.F.C. accurately as to cases requesting and deserving accommodation.

Such investments, of short term character, would materially expedite the recovery program and the Government would get its money back as well as speed reemployment. Billions for public works but not one cent for self-liquidating industry is not a sound principle.

How About Giving Us a Lift?

Ford's Experience With Rustless Steel

By J. L. McCLOUD
Metallurgist, Ford Motor Co.



THE loading end of the mechanical-chemical washer through which rustless steel hub caps pass. Caps are subjected to a mechanical scrubbing in boiling chlorinated hydrocarbons and emerge through the back high leg of the machine.

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TYPES of rustless steel used in largest quantities by the Ford Motor Co. are the so-called 18 and 8 and 18 rustless. The former is of the following analysis: Carbon, 0.05 to 0.10 per cent; manganese, 0.30 to 0.45; chromium, 16 to 18; nickel, 7 to 9; silicon, 0.15 to 0.30; phosphorus, 0.04 max.; and sulphur, 0.05 max. The 18 rustless is of the same analysis as the 18 and 8 except that it has a maximum of 0.50 per cent of silicon.

Physical properties of these rustless steels, as revealed by test bars cut from representative sheets, are as follows:

	18-8	18
Elastic limit, lb. per sq. in.	35,000-45,000	50,000
Tensile strength, lb. per sq. in.	85,000-95,000	75,000
Elongation in 4 in., per cent	50 min.	27 min.
Erickson test, per cent	11 min.	.....
Rockwell test	75-83B	C-80

Rustless steel sheets in the polished state should withstand a 20 per cent salt spray for several hundred hours without showing rust spots. So far as salt spray correlation to actual service is concerned, I do not believe any definite relation can be given without supposing some particular climatic conditions of exposure and service. We do believe, however, that good resistance to salt spray indicates longer probable life. In the case of plated work, life in service and resistance to salt spray increase with the thickness of the plate.

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THE author describes the problems met by the Ford Motor Co. in using rustless steels, particularly the so-called 18 and 8 and 18 alloys. He stresses the importance of the grain size of the steel, the need for special dies for drawing operations and the desirability of avoiding extra work in polishing the finished stampings. He tells how rustless steel hub caps are polished, cleaned and painted. The article is an abstract of a paper read before the Springfield and Worcester, Mass., chapters of the American Society for Steel Treating.

The grain size of rustless steel, which seems to influence the smoothness of drawn parts, is of importance. When a coarse-grain carbon steel is drawn, it is often noted that a rough "orange peel" surface is obtained. This point is particularly to be stressed in rustless steels, since they seem more prone to develop this condition. In order to polish the steel to a mirror-like finish for bright parts, it is necessary to polish to the bottom of these pits or scales. It is also essential to remove all oxide inclusions as they would become the starting point for rust. Fortunately should these rust spots appear, they are not adherent and can easily be removed by washing.

Considerable cost in the finished articles lies in the polishing, so that extra work at that point must be avoided. This cost, of course, is influenced by mill treatment and can be reduced by proper steel condition. Thus the steel must be closely watched for this. To a certain extent any material which does not measure up to the standard can be detected by the Erickson test cup examination.

It has been the usual Ford

practice to add to a steel specification that the steel must be in such condition as to form the parts for which it is supplied. This practice makes necessary close cooperation between the producing mills and the fabricating shops.

The task of polishing the finished stamping is secondary in difficulty only to the primary press shop operations, for the rustless steel sheet is so soft (by indentation tests) and tough that ordinary methods of polishing and buffing are inadequate. Accordingly Ford engineers developed a large battery of high-production polishing and buffing machines which handle the work automatically, although several hand repair operations have been found necessary.

Compared with ordinary carbon steel sheets, rustless steel sheets are 20 to 30 per cent more ductile, but the ductility decreases faster during drawing operations because of its work-hardening properties. Rustless steel sheets are relatively softer and yet stiffer on account of their higher yield point and demand a greater allowance in die construction for the factor of spring back. They require more pressure to form, inducing severe abrasive action which produces inordinate wear on dies. Thus die design must be modified and special die steel used. Moreover a special drawing solution for lubricating the sheets and dies is required.

At critical sections in the die where considerable drawing occurs, there is a definite tendency to objectionable stretch, but this is successfully offset by providing greater clearance at these points. Strangely enough, although rustless steel sheets exhibit unusual work-hardening properties, it has been found possible to eliminate annealing preceding the operation on the expanding die. At first it was necessary to anneal before forming the filler neck, but this has been overcome by punching a larger hole before forming the neck. With the type of progressive press used to form head lamp shells, the die is made of high-speed steel and the punch of hardened carbon tool steel.

COMING from the mechanical-chemical washer, hub caps pass over a spray table to be painted. The operator holds a shield over the caps to protect the V-8 emblem as he sprays the enamel paint on the caps when they pass over openings in an exhaust duct.

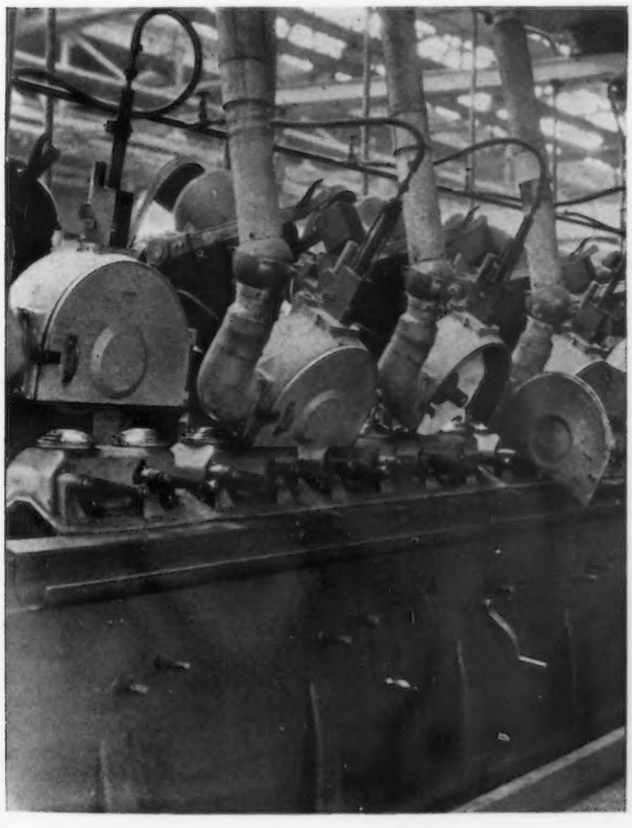
At present hub caps take the largest amount of rustless steel in the Ford car. Former hub caps smaller in design and without decoration in color are not so interesting except to note that as with the present ones it was necessary to reinforce them with a heavier backing of low-carbon open-hearth steel to produce the required stiffness. Present operations are blanking from strip stock, drawing, trimming, flanging and pressing, assembling, spinning over of the edges, washing and painting.

For the drawing work no lubricant is needed, but the blank must be held snugly to prevent slippage. Actually the gage of the metal is materially reduced. The punch as well as the die for this operation is made of chrome non-shrink steel. Present operations are done on separate machines. In the trimming work the punch and die are made with little clearance to give shearing action. They are of chrome non-shrink steel.

Hub caps are polished and buffed on automatic machines. After being buffed, they are cleaned in a mechanical-chemical washer. The loading end of the conveyor leading through the washer extends up to the balcony where the polishing machines are located. Caps pass through a bath where they act as cooling condensers for the vapors of boiling chlorinated hydrocarbons. In the washer they are subjected to a mechanical scrubbing with the same chemical and emerge through the back high leg of the machine.

Coming down from the washer, caps pass over the spray table to be

(*Concluded on page* 60)



RUSTLESS steel sheets are so soft and tough that ordinary methods of polishing and buffing are inadequate. Ford engineers have developed high-production machines which handle the work automatically.

Growth of Gray Cast Irons

By THOMAS J. WOOD
Bayonne Laboratory, International Nickel Co., Inc., Bayonne, N. J.

GRAY iron castings which are subjected to repeated heatings at elevated temperatures increase in volume, in some cases as much as 40 to 50 per cent. This phenomenon, which has been fittingly characterized as "growth," was first observed more than 100 years ago, but it was not until 1905 that any serious attempt was made to study its causes. Since that time it has been established that the growth of cast iron may be classified under two separate temperature ranges: (A) That which takes place at subcritical temperatures, and (B) that which takes place above the critical transformation range. While these two conditions are interrelated to a certain extent, each will be considered here independently of the other for the purpose of clarity.

Causes of Growth Below 1300 Deg. F.

There seems to be quite general agreement that at temperatures below about 1300 deg. F. (700 deg. C.) (or below the transformation range) the growth of cast iron is primarily due to the decomposition of iron carbide into ferrite and graphite. A few investigators believe that additional volume changes result from the oxidation of silicon in the iron matrix. Growth resulting from graphitization is facilitated by high contents of silicon, carbon, and nickel (when no compensating adjustment of Si is made), and is retarded by high contents of chromium and sulphur. The relation of Mn content to growth is not clear because of contradictory statements concerning the effects of this element.

*Developed by Norbury and Morgan and reported to contain 18 per cent Ni, 6 per cent Si, 2 per cent Cr, 1.8 per cent total carbon and 1 per cent Mn.

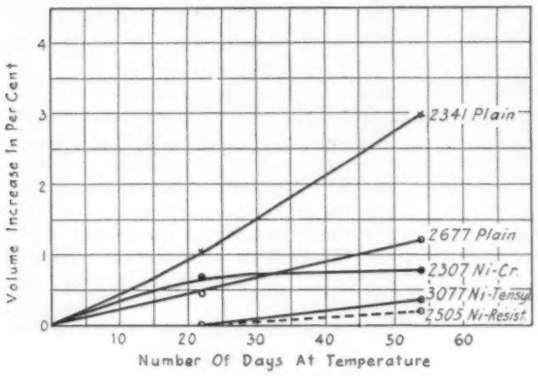
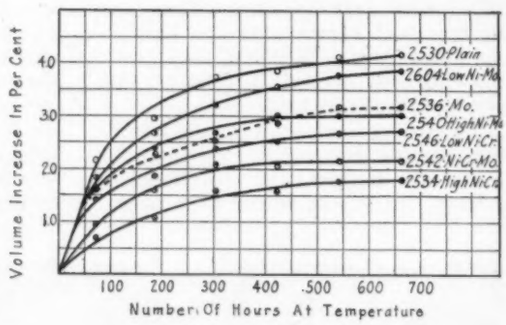


Fig. 1 (at Left)—Plain cast iron of 2 per cent silicon showed the greatest growth, when subjected to steam at 900 deg. F. temperature, while a nickel-chromium-copper cast iron showed the least.

Fig. 2—Nickel-chromium cast irons, in a long test at 1100 deg. F., show high suitability for automotive cylinder blocks, because of resistance to growth and to softening.



Causes of Growth Above 1300 Deg. F.

The majority of the investigators appear to concur in ascribing the causes of growth of cast iron at temperatures above about 1300 deg. F. (700 deg. C.) to the graphitization of the combined carbon, the oxidation of the silico-iron matrix, and the expansion of occluded gases. In ordinary cast iron, growth is dependent upon the silicon content, high amounts of this element favoring high permanent expansion. The action of manganese with respect to growth has not been clearly established. Growth may be appreciably retarded by the elements chromium and phosphorus. Compositions which must be strong and machinable in addition to being heat-resistant may be obtained by substituting for part of the silicon content suitable amounts of nickel, or nickel and chromium.

Exceptionally good growth-resistance may be obtained in the more highly alloyed cast irons of the Ni-Resist and Nicrosilal* types.

It is quite evident that the growth obtained by repeatedly heating cast iron above the transformation range is due to more complex causes than that occurring at the more moderate temperatures.

Present Investigations

THE growth of cast iron at elevated temperatures has been a subject of intensive study at the Bayonne Research Laboratory of the International Nickel Co. over a period of several years. As this work progressed it became evident that growth could be classified under the two categories indicated in the review of previous literature, namely, that which took place at (a) sub-critical temperatures and (b) super-critical temperatures. It may be pointed out that inasmuch as the low temperature growth does not involve nor require transformational changes, only continuous heating was necessary for the tests, as contrasted with the intermittent heating essential to the acceleration of

TABLE 1—GROWTH OF CAST IRON IN STEAM AT 900 DEG. F.

Heat No.	Type	Analysis					Volume Increase in Per Cent After Indicated Number of Days		Tensile Strength, Lb. per Sq. In.		
		TC	Si	Ni	Cr	Cu	22	54	Original	After 22 Days	After 54 Days
2341	Plain	3.48	2.02	...	...	...	1.01	2.99	18,400	13,840	10,600
2677	Plain	3.36	0.82	...	...	...	0.45	1.22	32,900	32,840	27,200
2307	Ni-Cr	3.04	1.39	0.96	0.33	...	0.68	0.78	43,000	39,720	41,300
3077	Ni-Tensyl	2.89	2.45	1.45	...	...	0.00	0.36	47,000	54,760	55,200
2505	Ni-Resist	3.04	1.64	13.63	3.23	6.48	0.00	0.23	24,050	27,720	28,400

the permanent expansion occurring at the higher temperatures.

Low-Temperature Experimental Studies

A series of plain and alloyed cast irons, the compositions of which are shown in Table I, were exposed within a superheated steam line operating at an average temperature of 900 deg. F., (480 deg. C.). The results of these tests are shown in Table I, with the growth data graphically represented by Fig. 1.

In addition to the fact that the alloyed irons are superior to the plain irons in growth resistance, it will also be observed that the strength losses of the plain irons are of a much higher order than those of the nickel-containing compositions. Indeed, the "Ni-Tensyl"* and "Ni-Resist" irons

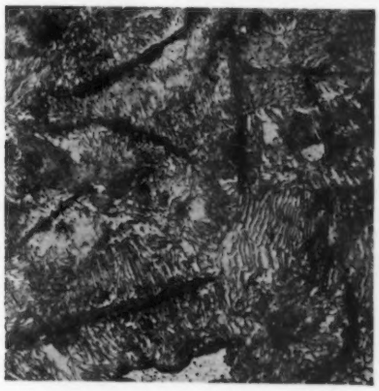


Fig. 3—Pearlitic structure in a normal cast iron; 1000 magnifications; 2 per cent nital etch; cut is one-half original size.

showed an increase of strength after exposure, an effect possibly due to the relief of casting strains.

These, as well as other tests in steam at temperatures varying from 580 deg. to 1100 deg. F. (300 to 600 deg. C.), failed to develop any evidence of oxide penetration in either the plain or alloyed types of iron.

In studying the effect of prolonged heating (90 hr.) at 600, 800, 1000, 1200 and 1300 deg. F. (315, 425, 540, 650 and 700 deg. C.) upon cast iron, it was established that at temperatures below the critical the stability of the combined carbon is a function of the silicon content. A low Si, Ni-Cr iron again displayed exceptional resistance to structural deterioration in these tests.

In automotive cylinder blocks it is essential that the valve seats maintain their hardness and do not warp or grow at operating temperatures. While these operating temperatures are difficult to determine exactly, and moreover, vary with the design of the engine, it is nevertheless generally conceded that they are in the sub-critical range. Consequently, a series of typical automotive compositions were selected for growth tests at 1100 deg. F. Determinations of the progressive losses in hardness of the various irons with time of heating were also made. The test data are given in Table II, and the curves plotted from the growth data are shown in Fig. 2.

Both the growth curves and the hardness data clearly demonstrate the usefulness of the high Ni-Cr composition of heat 2534 as an engineering material in which resistance to growth and softening are requisite.

Figs. 3 and 4 are illustrative of the manner in which the combined carbon breaks down in cast iron and causes growth. The pearlitic structure of a normal iron in the "as cast" condition is shown in Fig. 3. The deterioration of the pearlite caused by heating for 662 hr. at 1100 deg. F. (600 deg. C.) is shown in Fig. 4.

The results of these tests establish three useful compositions for applications requiring resistance to growth at sub-critical temperatures. These three irons—Ni-Tensyl, Ni-Resist, and the Ni-Cr type—offer not only resistance to volume changes but retention of strength and hardness as well.

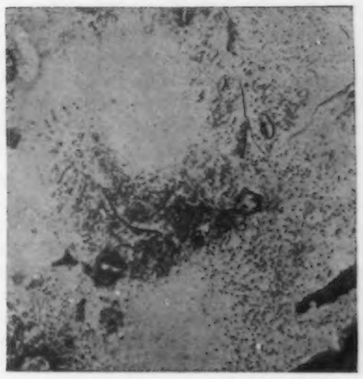


Fig. 4—Deterioration of pearlitic structure caused by heating at 1100 deg. F. (600 deg. C.) for 662 hr.; 1000 magnifications; 2 per cent nital etch; cut is one-half original size.

(A second part of this article will devote itself to the findings of tests of castings at elevated temperatures.)

WHAT causes growth in castings and what compositions serve to inhibit it have been studied at length by numerous tests at the research laboratory at Bayonne, N. J., of the International Nickel Co. The investigations cover the behavior at elevated temperatures as well as at temperatures below the critical range. They have demonstrated how nickel may be used to prevent or delay growth and have resulted in recommendations as to alloy cast irons for specific uses. In connection with the laboratory work, a searching survey was made of the literature on the subject, the scope of which will be indicated by a printing at the end of this article of the bibliography. An unusually detailed analysis of this literature compiled by the author had to be omitted for lack of space.

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*Ni-Tensyl cast iron is made by a patented process in which a steel charge is melted down in the cupola and tapped out as a low-carbon cast iron containing about 1 per cent Si and 0.70 per cent Mn. This iron is graphitized at the cupola spout during tapping operations by suitable additions of nickel and ferrosilicon. As its name implies, the outstanding characteristic of this iron is its high tensile strength.

Rubber Coating for Metals

Rubprotex, a product of the Rubprotex Laboratories, 1059 East 76th Street, Chicago, is a newly developed rubber product in liquid form which can be applied the same as paint. It prevents corrosion in nearly all forms and it is claimed will protect all types of metallic surfaces and is equally effective on wood, concrete or textiles. It will not harden, crack or become brittle under all atmospheric conditions and it can be removed from any surface by using ordinary solvents such as gasoline, benzol, naphtha, etc. It should not be applied to surfaces coming in contact with oils and solvents injurious to rubber.

TABLE II—STABILITY OF AUTOMOTIVE CAST IRONS AT 1100 DEG. F.

Heat No.	Type	Analysis TC	Si	Ni	Cr	Mo	Volume Increase, in Per Cent After Indicated Number of Hours 72	185	303	422	542	662	Brinell Hardness Numbers After Heating Indicated Number of Hours 0	113	231	350	422	542	662
2530	Plain	3.44	1.96	...	...	...	2.16	2.97	3.74	3.86	4.12	4.17	179	103	95	102	105	89	101
2536	Mo	3.43	1.78	...	...	.32	1.64	2.29	2.53	2.88	3.18	3.18	170	131	116	121	114	108	116
2604	Ni-Mo	3.35	1.99	.63	...	.41	1.82	2.67	3.22	3.56	3.77	3.86	156	116	96	93	94	88	97
2540	Ni-Mo	3.21	1.99	1.03	...	.32	1.68	2.38	2.67	3.01	3.01	3.01	175	129	119	120	124	126	121
2542	Ni-Cr-Mo	3.48	1.94	.92	.28	.21	0.94	1.62	2.08	2.08	2.17	2.17	196	175	143	149	143	134	137
2546	Ni-Cr	3.44	1.94	.75	.27	...	1.40	1.87	2.38	2.51	2.68	2.72	187	153	121	126	130	124	118
2534	Ni-Cr	3.41	1.97	1.73	.60	...	0.68	1.06	1.57	1.57	1.78	1.82	217	179	163	168	165	156	156

Housings of New Large Sheet Mill

THE forged steel, welded housings of the 84-in. four-high sheet mill built recently by the E. W. Bliss Co. for the American Sheet & Tin Plate Co. were cited by H. G. Marsh, Carnegie Steel Co., in his interesting paper on "The Use of Rolled Steel in Machine Construction," read at the recent meeting of the American Iron and Steel Institute.

Further data on this notable application of welded steel were given by Lloyd Jones, manager of the Bliss company's Salem, Ohio, plant, and originator of the idea of constructing these housings in the manner illustrated. The following paragraphs embrace not only Mr. Jones' discussion but also that of Mr. Marsh, especially the part not included in the abstract in THE IRON AGE of June 1.

The first reference to these housings by Mr. Marsh was in connection with design for welding. Replacing cast iron or cast steel with rolled steel, part for part, section for section, results in nothing gainful, he said. The best way is to start anew with a careful analysis of the function of the machine and its component parts. The direction and magnitude of the stresses involved should be calculated as closely as possible, their relation to each other studied, and then the best adapted rolled steel sections should be selected and combined in the simplest possible way.

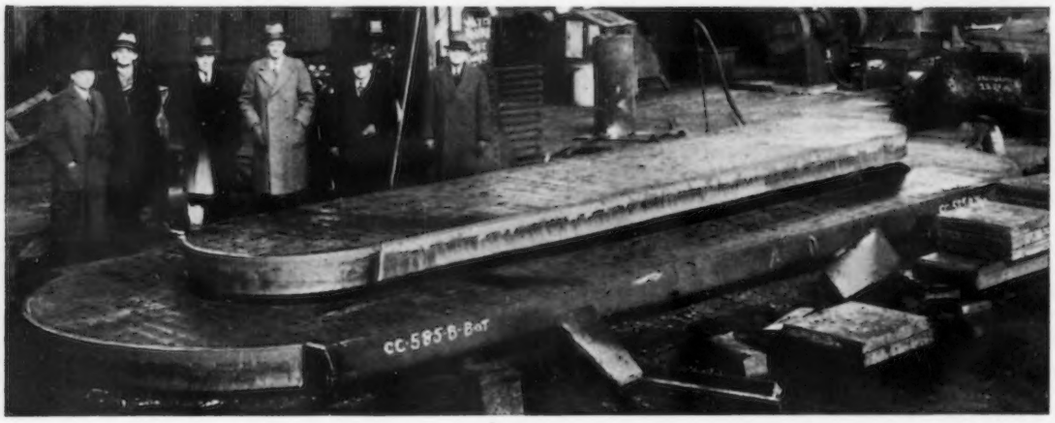
The welded steel housing of the Bliss mill was cited as a fine example of this procedure. The essential element in a mill housing is a closure, which will confine the rolls to vertical alinement and permit vertical adjustment and vertical pressure. Obviously, a rectangular closure would be a poor one from the standpoint of stresses, so by rounding the ends we have an elongated link and by inserting a screw jack between the rolls and the inside top of the link it fulfills all the requirements of a housing. All that is now necessary is to provide feet which will assure its maintaining a vertical position. If the designer had attempted to reproduce a conventional housing in welded steel with all its irregularities of contour and section, the result would have been entirely different and perhaps not practical from a cost standpoint.

This job, Mr. Marsh pointed out, is also an example of the help the steel maker can give the designer if he is acquainted with all the factors involved. The housing was originally designed for plates 2 in. thick, but because of the large percentage of scrap and excessive machining, it was suggested it be made of thick forgings, in which case an allowance based on the price of slabs could be made and the material cut from the center. This center piece amounted to 46 per cent of the weight of the rectangular slab from which it was cut, and the allowance, a perfectly legitimate one, made the design commercially possible.

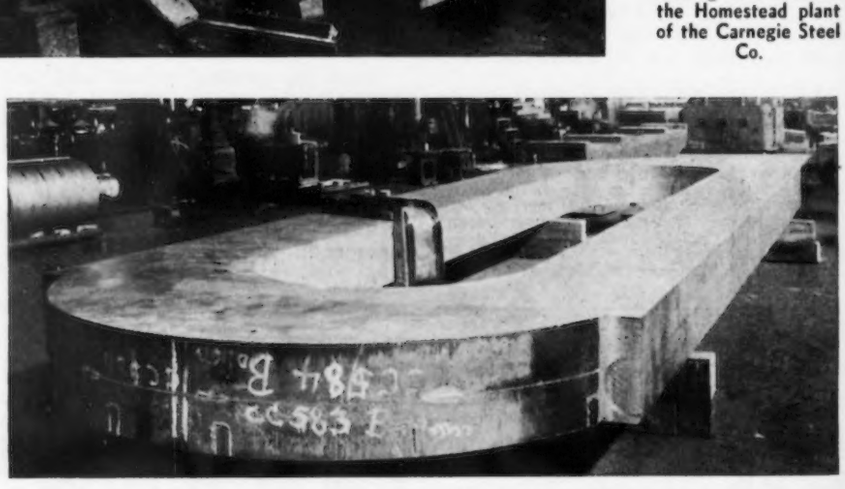
In illustrating the welded housings of the Bliss 84-in. four-high cold rolling mill, Mr. Marsh pointed out that the object of the design was to secure housings with equal stretch. The primary idea, he said, is a steel link set on a cast steel base with the screw-down mechanism self-contained within the links.

Four methods of building up the link were considered. The one adopted uses four forged steel plates about 8½ in. thick, welded together. The scrap cut from the center of each plate could be used for rerolling and a slab price allowed on it, as mentioned above. This, it was said, brought the cost per pound below that of cast steel.

The fourth method considered, but not adopted in the housings illustra-



FOUR of these 33-ton forged steel links were welded together to form each housing of the Bliss 84-in. four-high cold rolling mill. Each link was flame-cut from an 8½-in. thick slab, the center portion being kept by the mill for rerolling. The forging and flame cutting were done at the Homestead plant of the Carnegie Steel Co.



LINK forgings machined and welded, ready for assembly in the 84-in. mill. Because of the smoothness of the flame-cut surface no machining was required on the ends of the built-up housing links. The eight forgings that formed the housings were completed—ready for delivery—in about four weeks.

Made of Welded Forged Steel ▲ ▲ ▲

ted, was designed to eliminate all scrap. It consists of a core of heavy rolled steel slabs for the sides and semi-circular steel forgings for the ends of the housings. Universal mill plates of the proper width were then to be formed around the core and shrunk on. These bands were to be made in halves, butt welded, and the welds of the successive layers would be, of course, staggered. Some welding was also contemplated along the edges. In addition to eliminating scrap this method permits building up of housings to almost any size.

ing about 33 tons were forged, torch cut and rough machined and ready for shipping in four weeks time. Two equivalent cast steel housings weighing 110 tons each would require two to three times as long a delivery, said Mr. Jones.

Another reason was better material, due to absence of shrinkage strains, blow holes and other imperfections frequently occurring in large steel castings. A third reason was easy transportation; as the housings could be shipped in sections, no special cars were required. Better machineability due to absence of hard chilled spots, was another factor. Finally, uniformity in physical properties was considered an advantage. In the rolling of wide material of accurate gage, it is extremely important that the elongation of the two mill housings under load shall be practically the same. This is particularly true, said Mr. Jones, when you are trying to maintain a gage variation over the entire width of plus or minus one-half thousandths (0.0005 in.).

The built-up type housing using multiple links of welded universal plate, one shrunk over the other (the fourth type mentioned by Mr. Marsh) was said to have many desirable characteristics and to be worthy of careful consideration.

"From the illustrations it may be seen that by carefully analyzing the machine and paying close attention to

(*Concluded on page* 60)

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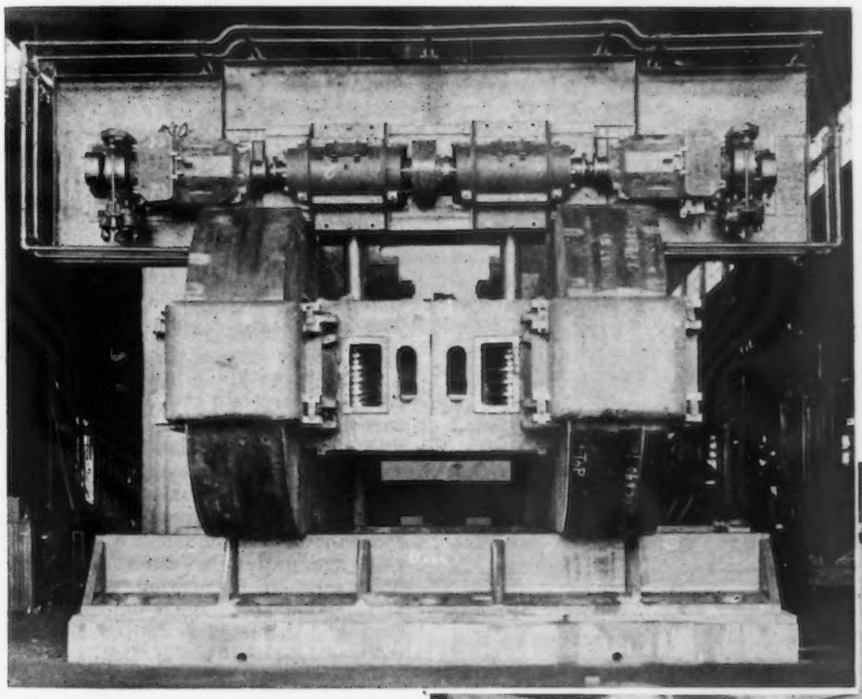
BLISS 84-in. four-high cold rolling mill (below) in horizontal position, partly assembled. Working rolls are 20½ in. and backing rolls 56 in. in diameter, 84-in. wide. The capacity is for strips or sheets 72-in. wide. The screw-down is capable of exerting pressure of 12,000,000 to 13,000,000 lb.



END view (above) of 84-in. cold rolling mill, as assembled in horizontal position, showing the laminated type housings, and the type of screw-down employed.

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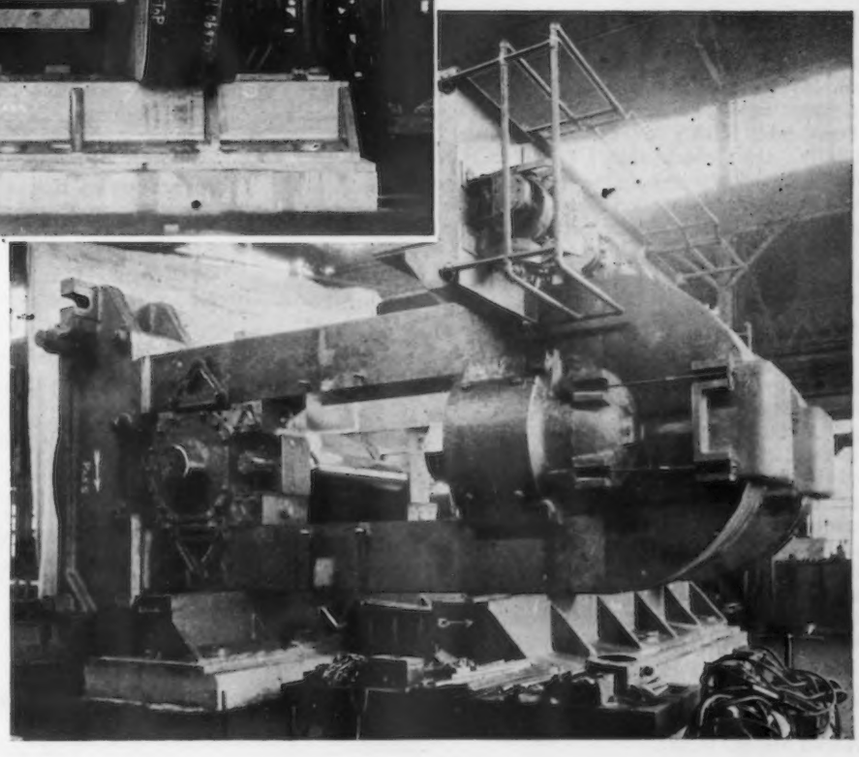
Mr. Jones, in his discussion of Mr. Marsh's paper, pointed out that the 84-in. mill mentioned is believed to be the most powerful cold rolling mill ever built. Backing rolls are 56 in. in diameter and working rolls, 20½ in. in diameter. The screw-down is capable of exerting a pressure of 12,000,000 to 13,000,000 lb.

Reasons for making the housings of welded steel included quick delivery of raw materials. Eight forgings weigh-



▲ ▲ ▲ New Method for Determining M

By DR. C. MORRIS JOHNSON
Chief Chemist, Park Works,
Crucible Steel Co. of America

As a result of numerous attempts to avoid the use of hydrogen sulphide for the rapid and accurate determination of molybdenum in alloy steels, the following discovery was made by George Warren Johnson of the Park Works laboratory of the Crucible Steel Co. of America.

If the molybdenum in acid solution be reduced by the well-known stannous chloride method and the usual red color is developed with KCNS, on next adding cinchonine to this red colored solution, molybdenum quickly separates as a red to violet compound. In color, this substance, which is new to us, reminds one of the dimethylglyoxime precipitate from nickel solutions. This "new" composition is decolorized in NH_4OH, or caustic alkali, leaving a white flocculent precipitate.

The red color is quite permanent, so far, in the laboratory atmosphere. The precipitate is turkey red when moist and dries out to a handsome pale rose shade, and is of impalpable, rouge-like texture.

Other reducing agents can be used instead of stannous chloride. For example: Reduce the iron and molybdenum with sodium thiosulphate. Then add KCNS or NH_4CNS and finally the cinchonine. By this method, the precipitate separates as a pale pink formation interspersed through a liquid cloudy with white sulphur. Color varies from pink to red depending on the amount of Mo present.

Gravimetric Value

On attempting to use this compound for a gravimetric determination of molybdenum, it was found that copper is co-precipitated as in the H_2S method. It was also noted that gravimetric results, fairly close to the actual molybdenum per cent, could be obtained in the usual run of molybdenum steels and that neither Cr, Mn, Fe, nor V interferes. But a certain amount of tin is mechanically brought down, the removal of which causes too much lost time. We have also found that fairly accurate and rapid quantitative determinations of molybdenum can be made with thiosulphate alone.

It was decided to try a combination method, i.e., reducing with thiosulphate instead of tin salt. This scheme promises to eliminate H_2S from the iron and steel laboratory, providing one uses G. W. Johnson's KCNS method for copper in steel[1] and electrolytic separations for brasses and bronzes.

It might be well to emphasize, at this point, the dangers of breathing, daily, laboratory air mixed with H_2S. This gas will kill a mouse as quickly as hydrocyanic acid gas. We have tried it on Pittsburgh mice. The writer knows, personally, of one chemist in charge of a laboratory that was incapacitated for months from working continuously with this gas. He was not in the employ of the Crucible Steel Co.

The discoverer of this red compound of molybdenum cinchonine and cyanate was also laid up several times with H_2S poisoning. Two others were sickened by H_2S in our force. If once overcome, the victim is more sensitive to bad effects in later exposures.

Method (A), Approximately Quantitative Method for Preparation of Red Pigment

Weigh 1 and 2 gm. of drillings into 600 ml. beakers. Add 200 ml. of 1:7 H_2SO_4. Heat till decomposed. Remove from the heater. Add 20 drops of 30 per cent H_2O_2. Boil 1 minute. Rinse lid and sides down and dilute to original volume. Add 100 ml. H_2O. Then 20 ml. KCNS (50 gm. in 1000 ml. H_2O). Next stir in 40 ml. $SnCl_2$ (500 g. $SnCl_2$) dissolved in 400 ml. conc. HCl (1.20 sp. g.). Then dilute the $SnCl_2$ to 2000 ml. Keep metallic tin shot in this solution.

After introducing the 40 ml. $SnCl_2$, add at once 70 ml. of cinchonine alkaloid solution (125 gm. of the alkaloid dissolved in 1000 ml. of 1:1 HCl). The cinchonine addition causes the almost instant precipitation, in the cold, of the highly colored compound of Mo with cinchonine and KCSN.

This precipitate is filtered, and washed with 10 ml. cinchonine solution and 5 g. NH_4CNS in 500 ml. H_2O. The precipitate rapidly dissolves in water alone.

This precipitate is ignited at lowest red in a porcelain crucible to a mixture of MoO_3, CuO, and some tin. On weighing this ash and extracting same with conc. NH_4OH several times, and again ashing the ammonia insoluble; weighing it and deducting the weight from the first main ash, the MoO_3 and CuO are gotten by difference. The blue solution is titrated with KCN and the Cu so found is calculated to CuO and deducted from the MoO_3 + CuO weight as in the H_2S method. Always evaporate the MoO_3 to dryness with 10 drops of conc. HNO_3 before extracting with conc. NH_4OH. As stated, the method is only approxi-

RESULTS OBTAINED BY METHOD (C) COMPARED WITH OTHERS

Method	H_2S, Per Cent Mo	Bureau of Standards, Per Cent Mo	By (C), Per Cent Mo
No. 3390	0.088	...	0.106 and 0.088
No. 3981	0.92	0.92	0.915 and 0.930
U. S. No. 106 Nitralloy	0.17	0.163	0.170
No. 67419, Nitralloy	0.71	...	0.70
Average of Four Laboratories			
No. 5 standard	0.18	...	0.19
No. 52680 standard	0.274	...	0.282
No. 8 standard	...	0.24	0.228[2]
4/6 per cent Cr. steel	0.39	...	0.39, 0.40
"18-8" 3 per cent Mo steel No. 9426	2.98[2]	...	2.95, 2.96 (One ammonia extraction)
	3.02	...	2.97, 2.98 (Two ammonia extractions)

[2] The No. 8 standard required two ammonia extractions. All others were one extraction in (C) unless otherwise indicated.

[1] Rapid Methods for Chemical Analysis of Special Steels, p. 587, fourth edition; John Wiley & Sons Co., Inc.

[2] See "Rapid Methods for Analysis of Special Steels," p. 592.

Molybdenum in Alloy and Plain Steels

THIS article records the discovery of a new compound of molybdenum and in that connection the development of a new method for the rapid and accurate determination of molybdenum in steels. This is a gravimetric method, employing precipitation with cinchonine alkaloid, forming a red colored compound.

To the new compound has been given the name "Johnson's Molybdenum Red," as a tribute to the discoverer, George Warren Johnson. The development is the result of numerous attempts to avoid the use of hydrogen sulphide, and therefore to eliminate the serious dangers of breathing laboratory air mixed with that gas.

Other new methods of analysis, such as ascertaining aluminum and titanium in corrosion - resisting steels, will be outlined shortly in these columns by Dr. Johnson. As a rounded-out coverage of the current problems of the steel works' chemist, from one who has had intensive experience with the newer alloys, the proposed series of articles should properly be tied to the author's notable contribution in THE IRON AGE of Feb. 12, 1931, detailing methods of analyzing for carbon in rustless steels.

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mately correct on account of tin residue having to be repeatedly extracted with NH_4OH to remove all MoO_3.

Quantitative Method for Molybdenum by Precipitation With Sodium Thiosulphate

This way has given satisfactory results up to about 0.50 per cent Mo, but percentages of the order of 0.90, so far, are several hundredths too low, on the average, compared to standard H_2S method.[2]

Method (B)

Weigh 2 and 3 g. into 600 ml. beakers. Add 300 ml. 1:7 H_2SO_4 and heat until decomposed. Add 20 drops of H_2O_2 (30 per cent) to the warm (not boiling) solution of the steel. Boil 1 min. and cool. Dilute to original volume and add 100 ml. H_2O. Add to cold solution 40 ml. sodium thiosulphate (500 gm. in 1000 ml. H_2O). Heat to boiling and boil 1 min. Filter and wash 50 times with 10 ml. of sulphurous acid solution, of about 6 per cent H_2SO_3, in 500 H_2O. Ignite the brown sulphide of Mo in porcelain together with the copper sulphide at lowest red and finish for Mo as in H_2S[2] method.

Method (C)

This method is a combination of (A) and (B) and gives accurate results for Mo in all steels, i.e., accurate enough to meet the exacting requirements of present-day specifications. Results will check, in other words, within 0.01 to 0.02 per cent of Mo in a steel of the order of 0.90 to 1.00 per cent Mo. The qualitative value is unsurpassed; 0.06 per cent Mo is easily detected.

Dissolve 3 and 4 gm. in 600 ml. beakers with 300 ml. 1:7 H_2SO_4 and heat until decomposed. Remove from heater. Add 20 drops of H_2O_2 (30 per cent). Boil 1 min., cool, dilute to original volume of 300 ml. and add 100 ml. H_2O. Then pour in 30 ml. KCNS solution and stir to mix the solution. Add 30 ml. cinchonine alkaloid and again stir thoroughly. Now add 40 ml. (20 g.) of sodium thiosulphate and stir. The Mo appears at once as a salmon colored precipitate in the midst of a white sulphur cloud. In low percentages, of the order of 0.10 per cent, the pink coloration is slight. Continue stirring until the pale pink precipitate coagulates. This takes about 1 min. Now heat up till hot, i.e., to 160-170 deg. F. but not to boiling, i.e., bring just to temperature and remove at once from the heater. Filter through double No. 31 12.5-cm. ashless rapid filter papers.

Do not mix any paper pulp with the precipitate but put a ½-in. diameter ball of wet filter pulp in the bottom of the cone of filter papers before starting the filtrations. All of these precautions have been found necessary to secure filterable and washable precipitates. In other words, precipitates that do not cling tenaciously to the beaker walls and that can be washed free of the excess thiosulphate, etc. Ashless paper moistened with the wash makes a good scrubber.

Wash the precipitate and pulp 50 times with a cold wash consisting of 10 ml. 6 per cent sulphurous acid water plus 5 ml. cinchonine solution diluted with 500 ml. H_2O. Ignite at lowest red in porcelain crucibles; cool; weigh and evaporate dry with 10 drops conc. HNO_3; then extract the MoO_3 and CuO with 15 ml. conc. NH_4OH, heating 10 min. just below boiling; filter out insoluble through single No. 40 9-cm. ashless paper. Wash 10 times with a fine jet of cold water.

This volume of blue washings should not be over 30 ml. for titration of the blue copper with standard KCN. Before titrating, neutralize the excess of ammonia with conc. HCl from a dropping bottle till blue disappears. Then cool and add conc. NH_4OH until just blue and six drops excess. This is to get the best conditions for the KCN titration of the copper. The Cu is calculated to CuO and deducted from the MoO_3 and CuO weight. This weight is gotten by ashing the insolubles from the ammonia extraction; weighing ash, and deducting this weight from that of the first crude MoO_3 + CuO, etc.

The ammonia insolubles are washed ten times only with water to remove the blue color of the copper. This filtrate and washings are reserved for the KCN titration as already described. The insolubles are then washed ten times more; ignited free of char and weighed, and deducted as stated from crude MoO_3 + CuO weight.

Analytical data have been obtained in this laboratory which indicate that this red-purple compound of molybdenum as prepared varies somewhat in composition. One lot gave an analysis corresponding to $MoH_{23}S_{14}C_{22}N_5O_3$. A more recent batch is nearer to $MoH_{23}S_{13}C_{24}N_5O_7$. This variation, we believe, is due to occluded sulphur.

Unless it develops, later, that somewhere in the published chemical literature there exists a record of this red compound of molybdenum with cinchonine, we are inclined to christen it —"Johnson's Molybdenum Red."

New Things in Materials and Pr

CHATS on what is in store for the metal working industry is the term we could well apply to the budget of informative items here assembled. Notable developments now under way in such fields as metallurgy, heat - treatment and protective coatings are covered in particular, and Mr. Cone promises to discuss others of the same order from time to time.

Coating Metals With Aluminum or Tungsten

PLATING or coating of metals, such as iron or steel, is an old art, one of the oldest. And yet new developments are coming to light constantly. In fact two are on the threshold of announcement—tungsten and aluminum coatings.

Preliminary but somewhat meagre announcements have been made but no detailed facts are yet available. They will be soon. Perfection of electroplating of tungsten has reached the final stages with results that are sure to be of great value to industry.

Coating of steel with aluminum is claimed to be successful. From the display which I have seen of some of the results, there appears to be wide possible use for aluminum coated material. The aluminum is not applied by electrolytic methods—attempts to do this have never proven commercially successful.

Electroplating With Rhodium

IN the same field is the electroplating of rhodium—a rare metal. Facts regarding this were presented before the annual spring meeting of the Electrochemical Society in May, at Montreal. In a paper, "Electroplating of Rhodium," by Dr. Colin G. Fink, Columbia University, New York, and secretary of the society, the process was described. There are several interesting industrial applications, of which particulars may be shortly forthcoming.

New Method for Heat-Treating Rails

A NEW method for heat-treating steel rails has been perfected. Patent negotiations, however, are holding up announcements. The rails after treatment are said to stand very good drop tests; also careful etching tests at regular intervals show them to be free from shatter cracks.

In this connection it is recalled that a few years ago a method of heat-treating rails was proposed which consisted in suspending them from one end during the process, thus to prevent distortion. Several other heat-treating methods have been advanced but none has been generally adopted as yet. The steel rail, one of our most important products, has never been subjected to heat treatment on a commercial scale, except by the Sandberg air-blast process.

Signal Progress in Alloy Steel Castings

SITTING in during the deliberations of the sub-committee on alloy steel castings of the A.S.T.M. in New York, which formulated tentative specifications early in March, one was deeply impressed with the striking progress made in this branch of the foundry industry. This is especially true in the case of the writer who, while once active in that interesting department of foundry activity (some 20 to 25 years ago) has been out of touch with some of the details of the progress registered. Back in the 1900's, simple or full annealing was the only heat treatment then practiced, and tensile strengths of 80,000 to 90,000 lb. per sq. in. were the highest obtainable.

The new specifications, to be made public in June at the society's annual convention in Chicago, reveal in detail and in concentrated form the signal progress. Today, tensile strengths up to 150,000 lb. per sq. in. are now common practice with suitable elastic and ductile properties. Three heat treatments, now regular practice, are responsible for these enhanced values. These include, beside full annealing, normalizing and liquid quenching and drawing. Only a few years ago, quenching and drawing of a steel casting was regarded as heat treatment heresy and 20 years ago it was applied only to forgings and tool steels. Today steel castings are in many cases the equal of forgings which they are often replacing. Nor do they need to be replaced with welded structures.

New Light on Gray Iron Castings

AT the same series of meetings, referred to in the foregoing paragraphs, there was an opportunity to listen to the proceedings of a sub-committee of A-3 of the A.S.T.M. on gray iron castings. One was filled with admiration as one listened to the story of the completion of an exhaustive set of research tests on the impact values of many grades of gray iron. These data will also be presented at the convention in Chicago in June. They will reveal facts which will demonstrate the excellent impact properties of certain gray irons. It is believed no such comprehensive investigation has even been completed, here or abroad. This is another demonstration of the growing consciousness that gray iron has by no means lost its "place in the sun."

Beryllium to the Front

INCREASING interest is being displayed in the rare element—beryllium. Its possibilities, when alloyed with certain metals, are evidently quite revolutionary and valuable. This is particularly true of copper-beryllium combinations, as has recently been made public.

An American company is now marketing a "master alloy"—an alloy of copper and beryllium containing 12.5 per cent Be. This is offered as a basic raw material with which to introduce beryllium into copper and brass products. The same alloy is also imported.

Reduction of beryllium from its ore is the difficult and expensive problem. The German method is electrolytic reduction of a fused mixture containing fluorides while the American is said to involve the chlorides. Both are analogous to the electric fusion process for aluminum.

Predictions of wide use of beryllium as an alloy in steel and iron seem to be reasonable—at least as soon as the metal becomes cheaper.

nd Processes ▲ ▲ ▲

By EDWIN F. CONE

Greater Use of Wrought Iron

NEW developments in wrought iron products are about to be announced which are said to insure new properties and uses for one of the oldest of materials. Details are not available now but publication will be possible in the near future. It is indicated that, by special methods of manufacture and by manipulation of mixtures, new forms of the material are possible which are claimed to insure engineering and industrial uses not heretofore employed. Alloying is not a feature in these developments.

Titanium Solves a Problem

WHETHER in welding or in high temperature service, early use of the 18 and 8 type of rustless steels developed serious defects or failures. This was given the name of carbide precipitation—a type of intergranular corrosion. It resulted in a breakdown of the steel. There have been many research studies to overcome this tendency and several solutions have been found.

A successful procedure is to add titanium to the steel. This is claimed to prevent the phenomenon of carbide precipitation under the conditions mentioned. The usual amount of titanium required has been found to be an addition of about five times the carbon content. Thus a rustless steel of 0.10 per cent carbon would require about 0.50 per cent titanium. Already there has appeared an increased demand for titanium-bearing materials from the rustless steel makers. Announcement recently by the United States Steel Corpn., of a patented "Stabilized 18 and 8" calls for the use of titanium but the real factor is reported to be the heat treatment employed.

Three Methods of Making Rustless Steels

THERE are three general methods of producing the chrome irons or the chromium-nickel steels—the rustless steels. The one in most general use is to add a very low-carbon ferrochromium to the steel bath which has been processed to a very low-carbon content. The nickel may be added when called for.

A second method is called the direct method—reducing the chromium direct during the melting down and refining process, using a high-chromium ore as the source of the chromium.

The third and probably the most recent method is to obtain the high-chromium content by replacing the ore with a high-carbon (4 to 6 per cent) ferrochromium.

It is the two latter processes which have figured prominently in the recent celebrated patent suit. All the rustless steels are made by the electric furnace process.

It is not at all unlikely that in the not far distant future it will be possible to make these steels by the open-hearth process. This might well result in lower prices for rustless steels.

Alloy Steel Definition Needed

WHAT is an alloy steel? When shall we have a definition which can be quite generally accepted? It is planned to discuss this subject more in detail in these columns later. Proper interpretation is essential, particularly in the collection of statistics. Is a medium manganese steel (1.00 to 1.75 per cent Mn) an alloy steel? Also is a vanadium steel containing 0.10 to 0.20 per cent V an alloy steel? Similar questions pertain to molybdenum and copper steels, for some claim all these are not in the alloy class. Evidently a uniform classification is desirable for statistical and other reasons.

Crane Chains and Slings Stored in Floor Pits

PITS located in the floor under crane runways are utilized for the handy storage of chains, ropes and wire slings by the Ingersoll Milling Machine Co., Rockford, Ill. These pits extend along the wall close to the building columns and occupy unimportant space. However, the pits are covered by hinged steel-plate covers that are flush with the floor so that except for the time when a cover is up for removal or replacement of a chain there is no actual loss of usable live floor space.

Stenciled on the wall opposite each pit section are the designations of the chains, ropes or slings that belong in the section. Therefore operators always know exactly where to find the equipment needed. This scheme is a time saver and is convenient.

The pits are formed by a concrete trough which was poured when the floor was laid. At 3-ft. intervals are steel guides that permit the insertion of steel-plate partitions. The pits are 3 ft. deep and 3 ft. wide and the length of a compartment can be suited to needs by insertion or removal of partitions. The covers are in 3-ft. sections and match with the partitioned sections.

HOWARD COONLEY
President, Walworth Co.

▲ ▲ ▲ What Industry Thinks of

"Industry Can and Should Adjust Itself to Meet the New Conditions," says Howard Coonley.

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WITH the recent passage of the Industrial Recovery Act, industry faces a journey into uncharted territory, which to many appears fraught with danger. Even the most courageous executive will admit that it is untried and therefore the goal of the journey is a bit problematical.

In 1931 and 1932, I discussed with many groups and individuals that interesting question of when the depression would end and what would cause its demise. There was one answer and one alone. On it there was unanimity of opinion. That was that the end would come only when we found vigorous and intelligent leadership.

As a life-long Republican, I was naturally timid of the change to Democratic control last March. During the War, I had come in contact with Franklin Roosevelt and at that time had failed to discover those qualities of greatness which he has since displayed. The amazing change which he has brought about since his inauguration makes me realize how out of focus must have been my lens of estimate of his latent power.

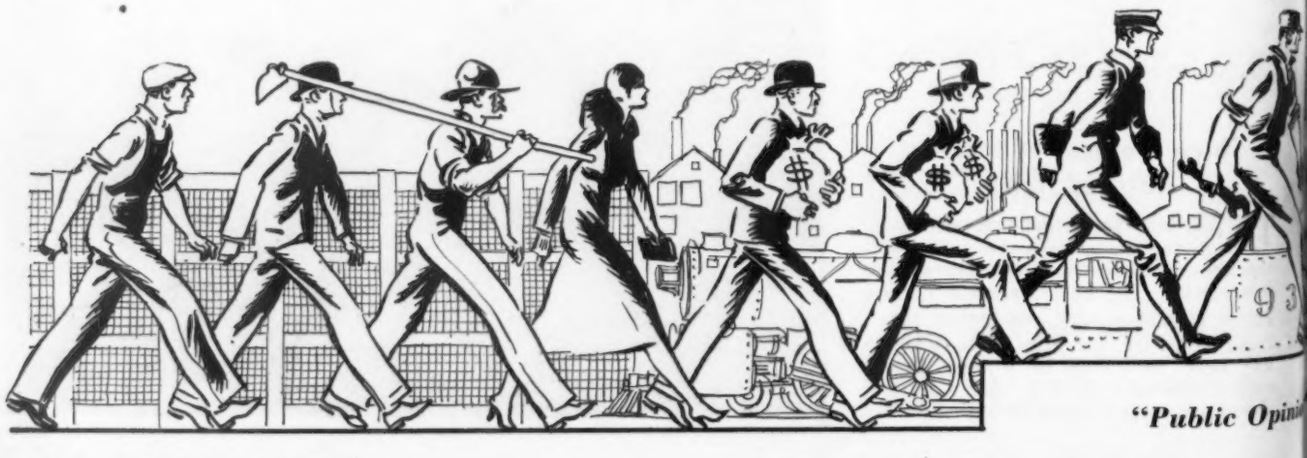
The leadership which we have all prayed for has come. It is inevitable that this leadership should have as its motive-power new ideas and, because new, to some extent experimental ones. The fact that industry has been pulled out of the mire by its bootstraps should make us all ready to accept these innovations and to back this new leadership with optimistic enthusiasm.

Certainly there is ample and tangible evidence of the benefits of the "New Deal" already before us. Groups of competitors who never sat about a table before have been brought together in cooperative discussion of ways and means to meet the requirements of the Recovery Act. Some who have heretofore met in timid consultation have been drawn into full and frank discussions of their common interests. Vast good must come from such gatherings.

Over many years, American industry has demonstrated its ability to progress. The present generation does not lack the acumen or the breadth of mind to adapt itself to the new situation. My journeys about the country have been constant during the past year and have stimulated my belief in the resiliency of the average American. Six months ago I found business men generally in a state of mind that indicated a dazed condition, which amounted almost to apathy. Today they are full of life and energy. Some are still disturbed lest we find ourselves jumping from the frying pan into the fire. But even this frame of mind is disappearing. Upon my recent trip to the Middle West, I was greatly stimulated by finding large groups actively at work in setting their own house in order. Industry can and should adjust *itself* to meet the new conditions.

I have sufficient faith in the American business man to believe that he is entirely ready to pay a wage that will make it possible for our working people to maintain a good standard of living and to have enough left over to indulge in modest luxuries. I believe that all these business men ask in return is a fair margin of profit that will enable them to rebuild their depleted working capital and to pay to their stockholders a reasonable return for the money which they have invested.

Further, I feel that I know the working man well enough to affirm that he is more interested in good working conditions and freedom from the devastating worry caused by an



"Public Opini

ks of Industry Control ▲ ▲ ▲

"Kill the Bear Before You Sell the Skin," says C. A. Moore.

▼ ▼ ▼

C. A. MOORE
Chairman-of-the-Board
Manning, Maxwell & Moore, Inc.

inadequate pay envelope than in participation in the management of the business from which he gains his livelihood. He wants and deserves a proper amount of opportunity for self-expression. He seeks and should have information as to the standing of the company with which he has cast his lot, the soundness of its financial structure and the foundation upon which its policies are laid. He will be happiest under those conditions of direct cooperation between employer and employee which we recognize as the American plan.

Howard Coonley.

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IN the National Industrial Recovery Act, American business has an unusually effective instrument, provided American business men make use of it properly and sincerely with good will. If great good does not come out of this act it will be another proof of the incompetence of American business leadership added to the many serious failures of this leadership during the past four years.

I believe that sincere good will is the single great necessity in operating trade associations under the Industrial Recovery Act. This is something which cannot be legislated into being, it must come voluntarily from leaders in the various industries as their common sense contribution.

The real task of a trade association is to put its industry on a sound earning basis. The functions of associations of the capital goods class are: The establishment and maintenance of a good spread between manufacturing costs and selling prices, the doing away with unfair trade practices and raising the collective morale of the industry to a point where it can resist all efforts to purchase below prices which give a fair return to the seller.

It is my opinion that trade practices are as little amenable to regulation by law as personal habits have proven under prohibition. The whole subject is outside the law, in the realm of public opinion. In the final analysis the public opinion created within each industry will be the only real force of any value. The collective good will and opinion of its members and their voluntary submission to what each one knows is right in the matter of trade practices offers industry an opportunity to profit greatly under the Industrial Recovery Act.

Good wages and good hours of work are so obviously dependent on a healthy condition in each specific industry throughout the nation that it is needless to comment on this self-evident fact. And it is equally clear that only by earning substantial and steady profits can an industry keep healthy and keep alive.

To squabble about the division of earnings in any industry before earnings are assured by cooperative action with good will, is like selling the bear skin before killing the bear, from the days of our cave men ancestors a simple-minded piece of folly.

Every trade association's first job is killing its bear, earning profits, afterwards its second job is dividing the bear skin.

The Industrial Recovery Act, I believe, recognizes these two jobs clearly and in the above order. It gives every essential power to accomplish both jobs. Success in recovery depends upon how American business men use their opportunities to build up honest earnings and to make an honest distribution of earnings.

C. A. Moore.

the Only Force of Real Value" . . . .

Non-Ferrous Sessions of A. S. T. M. at Chicago

ONE session of the annual meeting of the American Society for Testing Materials held in Chicago last week was devoted to non-ferrous metals. Bearing alloys particularly for use for automobile bearings was the outstanding subject of discussion.

A study of the physical properties of certain tin base and cadmium base bearing alloys was the subject of a paper entitled "A Comparison of Certain White-Metal Bearing Alloys Particularly at Elevated Temperatures" that was prepared by C. E. Swartz and A. J. Phillips, American Smelting & Refining Company, Maurer, N. J., and presented by the former. The authors pointed out that increased interest is being shown in white metal bearing alloys for use in automobile motors which is due, at least in part, to the trend toward higher compression, higher speed and more sustained speed of motors necessitating the use of a bearing composition that will withstand this more severe service. Methods of testing and results obtained were given in the paper which Mr. Swartz said was offered as showing results of preliminary tests of cadmium base bearing alloys made at temperatures at which bearings are subjected while in service. The cadmium base bearings were found in first class condition after being given a severe road service test. The authors found that in comparing the physical properties of tin base babbitts and cadmium nickel bearing alloys, especially at elevated temperatures, the latter showed a superiority.

The authors drew the following conclusions from the data obtained: The compressive strength of cadmium nickel bearing alloy is greater at all temperatures investigated than the ordinary tin base babbitt. The softening point of the cadmium-nickel alloy is higher than that of any tin base babbitts now in use. Creep tests indicate a much higher order of creep resistance in the cadmium nickel than in the tin alloy. Elongation and reduction of area show that both alloys are about alike in ductility. The hardness of the cadmium nickel alloy was greater at all temperatures studied than the hardness of the tin babbitt. However, micro hardness measurements showed that the cadmium nickel alloy is not too hard to act as a bearing contact for the softest steel shaft. The cadmium nickel alloy, unlike other cadmium alloys, is capable of readily bonding itself to steel as well as to brass and bronze, the alloys likely to be used as backing for bearings.

Dr. H. W. Gillett, Batelle Memorial Institute, in a written discussion on the paper, said that there is considerable evidence that cadmium base alloys provide a group of bearing alloys that behave as well as tin base alloys at low temperature and much better at the elevated temperature in bearings used in latest models of automobiles. Use of cadmium base alloys for severe services involving high temperatures in his opinion seems definitely to be coming. Since tin is controlled abroad and fluctuates widely in price he thought it possible that domestic cadmium may compete with foreign tin for bearing metal even where the ability to stand up at high temperature is not required.

H. K. Herschman, Bureau of Standards, said that the author's conclusions that impact values are closely related to hardness tests were not borne out by other data that have been compiled on that subject.

Effect of Lead at Elevated Temperatures

THE effect of the addition of lead on the hardness of certain tin base bearing alloys at elevated temperatures was the subject of a paper by J. N. Kenyon, civil engineering testing laboratories, Columbia University. The purpose of his investigation was to determine the effect of small additions of lead on hardness within the normal working temperatures of the material or up to 100 deg. Cent. and the effect of temperatures up to 200 deg. Cent. on the hardest alloys of the three tin base alloys examined. Results were shown in curves. While tin base bearing alloys have given good service in automobiles, the author said that with the recent trend toward increased horsepower and higher working temperatures bearing failures are expected. The addition of three to four per cent of lead increased the hardness up to 100 deg. Cent. No important falling off in hardness due to the addition of three, four and eight per cent of lead was found for temperatures up to 183 deg. Cent., but at higher temperatures the specimens containing lead crumbled under the load.

In the discussion the point was raised that hardness value should not be relied upon entirely for determining bearing surfaces and that brittleness might affect the wearing quality of bearings. Replying to this Mr. Kenyon said that hardness is not the whole story and that he is now making a fatigue test of tin base bearing alloys.

Sulphur in Red Brass

A PAPER on an investigation on the effect of sulphur and iron on the physical properties of cast red brass was submitted by H. B. Gardner, research associate of the Non-Ferrous Metal Institute at the U. S. Bureau of Standards, and C. M. Saeger, Jr., physicist at the Bureau of Standards. This paper was a progress report on an investigation sponsored by the Institute at the Bureau of Standards and the object of the investigation is the collection of data to be used in the simplification of typical compositions of copper base ingot metals. The paper was restricted to the discussion of a remelted alloy with a content of 85 per cent copper and 5 per cent each zinc, tin and lead. Methods of conducting the tests were outlined. Among conclusions arrived at were the following: The pouring temperature had a marked influence on the tensile strength, Brinell hardness, electrical resistivity and the density of the sand cast bars. The best results for the physical properties studied were obtained on test bars poured at 2100 deg. Fahr. Alloy containing sulphur up to 0.1 per cent and iron up to 0.6 per cent meets satisfactorily the requirements of the Society's present specifications. In general the running qualities of the alloy were improved by small additions of iron and sulphur.

Committee Recommendations

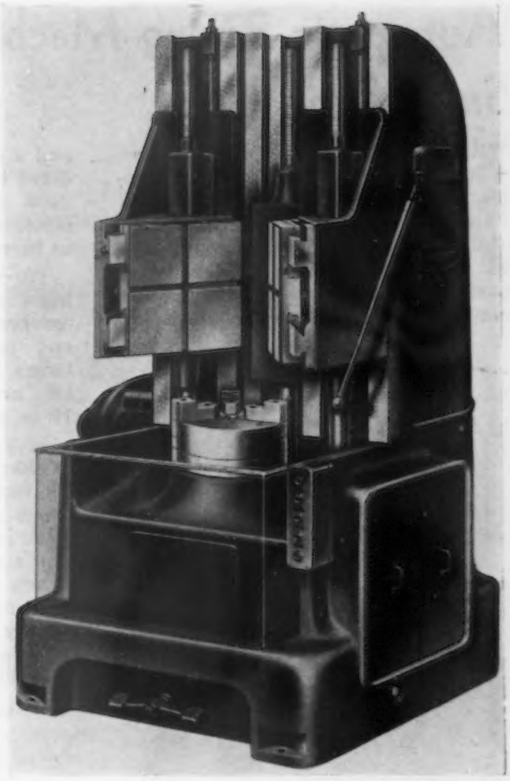
Committee B-2 on non-ferrous metals and alloys recommended for immediate adoption a standard specification for high grade sand zinc known as 99.99 per cent and for adoptions as standards present tentative standards for fire refined copper other than lake copper and methods of chemical analysis of silver solders. The report was accepted subject to letter ballot.

Committee B-5 on copper and copper alloys, cast and wrought, recommended that two tentative specifications for seamless copper tubing bright and annealed and for copper water tubing be advanced to standard specification and the advance to standard specification of tentative revisions covering certain condenser tubes and ferrule stock. The report was accepted.

Committee B-4 on electrical heating and allied subjects recommended the advancement to a standard specification of a tentative standard covering the accelerated life test of metallic materials for electric heating. The report was approved subject to letter ballot. This committee plans to work on standards for thermocouples.

Committee B-6 on die cast metals and alloys reported that a sub-committee has largely rewritten the tentative specifications for zinc base die castings and revised the tentative specifications for aluminum base die castings. Since the committee first started to investigate zinc base die casting alloys, alloy No. 23 has been developed and adopted commercially and requests were made that specifications be revised to cover this alloy.

Bullard Introduces Single-Spindle Automatic Vertical Lathe



IN presenting the new single-spindle automatic vertical lathe illustrated, the Bullard Co., Bridgeport, Conn., also introduces a new descriptive term. This new term is "Flex-Au-Mobility"—denoting flexibility, automaticity and mobility—which is to apply to a complete new line of Bullard machines. These characteristics are believed to be essential in meeting both present and future requirements of the metal working industry. Machines basically designed along these lines will be efficiently adaptable to either short runs or quantity production jobs. It is also believed that these characteristics will be economically effective in relation to frequent change of tool set-ups made necessary by change in work design or by varied production volumes.

Flexibility is most important from the standpoint of tool set-ups and their functions. This machine is equipped with three slides. The two universal slides have a downward and inward movement for chucked work and are also arranged to swivel for angular cutting; the one plain center slide has only a vertical movement. Each slide is controlled individually by separate screw feed works designed to give a total stroke of 20 in.

Application of a tailstock converts the machine into a center turning lathe, and for this the universal slides may be easily changed to feed inward, downward, outward, and upward, as required for many jobs of center work. Rapid traverse for the three heads is obtained through an independent motor, which is electrically interlocked to permit use of the one motor for the selective traverse of any individual head.

Simple, Rigid Tool-Holders Employed

Simple standard tool-holders of extreme rigidity are employed. They are easily and securely clamped to the slides. The design permits quick rearrangement for various diameters, changes in work design, or for changes requiring a completely different set-up. The variety of angular settings obtainable with this tooling not only increases the scope of operations with a given number of blocks, but also simplifies setting up.

Each of the three heads has 80 independent feed changes, obtained by means of change gears in their respective feed works. There are also 80 changes of table speed, with a maximum of 800 r.p.m. In addition, the standard machine has a two-way clutch controlled automatically during the cycle of operations so that the spindle speeds may be changed in the ratio of 3 to 1 or of 1 to 3 from the basic spindle speeds. This arrangement permits slowing down or speeding up during the machine cycle for taking sweeping cuts, reaming, tapping or threading at slower speeds, or finishing operations at higher speeds.

Rugged construction provides for higher speeds, heavier cuts, continued accuracy, and economical maintenance. The steel spindle, mounted on Timken bearings, carries a 12-in. three-jaw chuck which has a maximum diameter of 14 in. This chuck is equipped with a built-in adjustable mechanical power chuck operator with a foot treadle. Adjustment of jaw pressure is obtained by means of an adjusting screw located at the side of the machine, and the pressure may be regulated to suit both light as well as heavy pieces.

Anti-friction bearings lubricated by an automatic continuous-flow system are employed throughout the machine. The system provides for complete lubrication of the wearing surfaces of all three heads. It includes a 30-gal. oil reservoir located in the base; from the reservoir the oil is circulated through a filter under pressure. A 40-gal. coolant tank is also located in the base. Materials used in the construction of the machine include alloy steels specifically selected and heat treated for the specific duties of each unit. Slide units are of special alloy cast iron having high wear resistance as well as high tensile strength.

A feature making especially for flexibility of control is the automaticity and use of independent motors for the main drive, the rapid traverse and the lubricating system. These motors are electrically interlocked, thereby eliminating numerous mechanical interlocks and reducing maintenance. The electrical control is completely automatic during the operating cycle, but may be controlled independently by the push buttons at the operating position. A 20-hp. 1800-r.p.m. direct connected motor is used for the main drive and the 3-hp. 1800-r.p.m. direct connected motor for the rapid traverse. The lubricant pump is driven by a ½-hp. motor.

Capacity of the new Bullard single-spindle automatic vertical lathe is 10 in. in diameter and 32 in. in height when cutting with cross slides, and 10 in. in diameter by 36 in. in height when cutting with center slides. There is a possible swing in the clear of 18 in. diameter by 17½ in. height. The compactness and ruggedness of the machine may be noted in the projected floor space of only 57 x 67 in. with a weight of approximately 11,000 lb., without motors.

Other features include simplified vertical construction, and one handle and one foot treadle for normal operation of the machine. Tool setting flexibility is obtained by means of four electric push buttons for emergency control. The uppermost push button stops all functions; the next one down provides individual chuck motion; the third gives head traverse advance; and the fourth gives head traverse return. The fifth push button controls the pump motor. Another feature is the screw feed works, emphasized as providing especially satisfactory conditions for thread cutting.

As for mobility, it is stated that this new automatic vertical lathe, in providing complete and compact unit construction, affords possibilities of convenient reallocation for single-unit installation or battery installation wherein one or more machines may be moved quickly and easily to other locations and applied to other classes of work.

Link-Belt Co., Chicago, has issued a 48-page souvenir book of the Link-Belt exhibit at A Century of Progress. This book is profusely illustrated to show industry's needs in the handling of materials and the positive transmission of power. It also lists Link-Belt books and folders.

Automatic Boring Machine for Small Shop Use

THE Heald Machine Co., Worcester, Mass., has added to its line of Bore-Matic precision boring machines the small unit illustrated, which because of its facilities for quick set-up is suited for short runs of a variety of parts, without sacrifice of the automatic features of these machines. In

addition to small shops, it is expected that this Bore-Matic will find use in high-production lines where it is desired to keep one machine set up for each job instead of using a multiple set-up on a larger machine. Operation is entirely automatic, the operator being required merely to unload, load and start the machine.

The base is a heavy, well-ribbed semi-steel casting of box section, and has three-point contact on the floor to prevent distortion. The table is supported on one flat and one vee way, and is lubricated automatically. It is actuated hydraulically on the boring stroke and returned by a gravity mechanism. A removable hand-crank acting on a screw underneath the table assists in setting up, making it possible to set the table dogs quickly and accurately.

As the bridge of this machine is narrower than that of the larger units, the Nos. 46 and 47, only two boring heads can be accommodated. The bridge is also shorter from left to right, so that the boring heads are also shorter than those of the previous machines. A single 1800-r.p.m. motor direct connected to a high-duty hydraulic pump located low within the base drives the machine. The boring head drive is from the opposite end of the motor shaft, by means of multiple-V belts. Boring head speeds ranging from 625 to 3600 r.p.m. are obtainable through various pulleys; for lower speeds, a 1200-r.p.m. motor and a pump of larger capacity can be fitted to give a speed range of 425 to 2400 r.p.m. For coolant a separate motor-driven pump and tank unit can be furnished.

Three sizes of boring heads, including those of the company's Red Head construction, are available. Maximum and minimum center distances between heads of standard type when two are mounted on the bridge are 10 in. and 5 3/16 in., respectively.

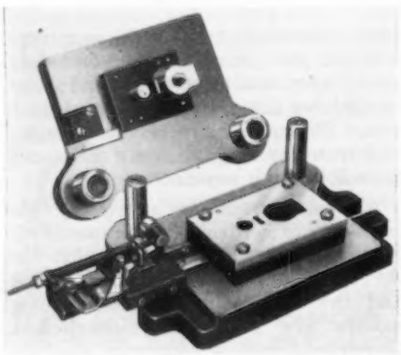
In addition to the stop and start mechanism, the control box consists of two practically identical units, which control the boring and facing feeds respectively. These control units can also be used for two different boring operations, and if necessary, a third unit can be added to give a third cutting feed to the table. The boring and facing feeds are controlled by knurled knobs, as shown.

Boring spindles are free to turn when not being driven—a valuable feature in setting up—and the crank permits quick and accurate setting of the dogs that control the boring stroke. This convenience of set-up is emphasized as adapting the machine for short jobs.

The working cycle is as follows: After the motor has been started (by moving the start-and-stop lever to the left) the table moves "in" at rapid traverse until the boring cam strikes the boring feed lever that projects from the top of the control box. This slows down the table according to the setting of the "boring feed" knob. The table continues at boring speed until the facing cam strikes the facing feed lever, which reduces the table feed still further, under the control of the "facing feed" knob. The screw in the stop dog then strikes a lever that snaps down and cuts off the power to the motor, at the same time braking the motor and boring heads by means of back pressure against the pump. The table has a dwell at the extreme "in" position to give the spindles time to stop before the table starts back to the loading position.

Press Feed Attached Directly to Die Holder

THE Producto Machine Co., Bridgeport, Conn., is distributing the "Dickerman Hitch Feed," illustrated, which is designed to automatically feed strip or coiled stock through power press dies. The device is at-

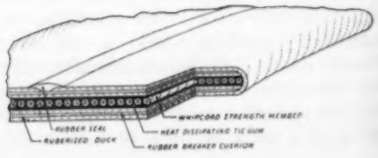


tached to the die set, which may be of any type, rather than applied to the power press itself. It includes an operating cam attached to the punch holder; on the downward stroke of the press this cam rides on a hardened roll and stud on the die-set base, forcing the slide back. On the upward stroke of the press a release spring functions so that the stock is pushed through the die to the required stroke. The device will feed material without a pilot, but in the event that pilots are used provision is made for the stock to slip in one direction for pilot registering.

East of set-up and adjustment are advantages claimed for the Hitch Feed. The exact feed length is determined from an adjusting nut as shown in the illustration. Hardened gripper plates are used for actually feeding the stock; one plate holds the stock, preventing it from backing up, while the forward plate performs the actual feeding to the distance required. The spring control furnishes the power required for pulling the stock from the reel or strip. The Hitch Feed has capacity for material up to 2½ in. wide and will feed stock ranging from 1/64 to 2 in., with very fine adjustments.

Transmission Belt of Whipcord Construction

A NEW belt featuring an endless-wound whipcord construction that is said to have no inelastic stretch has been brought out by the Manhattan Rubber Mfg. division of Raybestos-Manhattan, Inc., Passaic, N. J. Known as the Condor Whipcord, this transmission belt is offered for high-speed high-tension drives which require an endless belt. It is of continuous-endless-wound type, and its single layer of cord section is claimed to be the equivalent of six duck plies in strength and more flexible.



THE NEWS OF THIS WEEK

Scrap Institute Adopts Forty-Hour Week

A MINIMUM wage of 37½ cents an hour and a 40 hr. week were formally adopted at the annual convention of the Institute of Scrap Iron and Steel held July 5 and 6 at the Hotel Sherman, Chicago. The scrap industry voted unanimously to stand ready to meet all provisions of the National Recovery Act and to cooperate fully with producers and consumers of scrap.

The convention took up in order the recommendations adopted by the code committee, the purpose being to prepare the industry for a definite stand on a preliminary code which will be presented at Washington at an early date.

Agreement was reached quickly on the 40 hr. week. Southern dealers at first asked a 25 cent labor rate against 33 cents in the North. Sentiment quickly swung to a 37½ cent rate in the North which was adopted and southern dealers were satisfied to go on record with the recommendation that officials at Washington give consideration to a lower rate in the South compatible with the difference in living costs north and south of the river. During the discussion it was pointed out that steel scrap now brings about the same price at Birmingham as it does at St. Louis.

The convention also went on record against reciprocal agreements between steel mills and producers of scrap, involving scrap.

Rules of business practice approved by the Federal Trade Commission in 1929 were voted into the suggested code. This move adds to the enforcement of the old code, the additional powers and penalties provided for in the Industrial Control Law. It was made clear that the rules in the old code are accepted in principle, with the provision that some of them will be rewritten by a drafting committee to be appointed later.

Machinery for enforcement was voted as follows: Each of the 13 chapters will appoint an enforcement committee of three consisting of the president of the chapter and two other members. This committee will receive complaints of violations, investigate them and submit their findings to the national board of directors of the Institute, consisting of 15 men, which will be the national enforcement agency. The national board will have the final authority in determining the penalties and measures to eliminate violations, either within the industry or with the cooperation of the Government.

It was also voted to defer discussion or action on the question of price stabilization or on any rule condemning the sale of scrap below cost pending action which may be taken by the American Iron and Steel Institute.

All officers were reelected to serve until Dec. 31, 1933. This action was taken to serve the industry's best interests during the framing of the code under the Industrial Recovery Act.

These officers are: president, Herman D. Moskowitz, Schiavone-Bonomo Corporation, New York City; vice-presidents, Myron A. Cohen, The M. Cohen & Son Co., Cleveland; Frank Parker, Iron & Steel Products, Inc., Chicago; Charles Dreifus, Charles Dreifus Co., Pittsburgh; Ben Cohen, Louis Cohen & Son, Wilkes-Barre, Pa.; B. P. Williams, Hickman, Williams & Co., Inc., St. Louis, Mo.; secretary, Walter Erman, Erman-Howell & Co., Inc., Chicago; treasurer, Thomas F. Kelly, Brooklyn, N. Y.; chairman executive committee, Phil W. Frieder, the David J. Joseph Co., Youngstown.

Directors elected for the three-year term are: Herman Moskowitz, Schiavone-Bonomo Corporation, New York City; Phil W. Frieder, the David J. Joseph Co., Youngstown; W. J. Ross, Hyman, Michaels & Co., Chicago; Samuel N. Summer, the Joseph Schonthal Co., Columbus, Ohio; Ike Wilkoff, The Wilkoff Co., Youngstown; Alex Luria, Luria Brothers, Reading, Pa.; Louis J. Bornstein, Indianapolis; Sam W. Rubin, Wellsville Iron & Steel Co., Pittsburgh; Joseph Maher, Pennsylvania Wood & Iron Co., Buffalo; and for one year: David H. Cohen, D. H. Cohen & Co., St. Louis, Mo.

U. S. Metal Products Buys Great Western Co.

U. S. Metal Products Co. announces the purchase of Great Western Steel Co., Chicago. Effective July 1, 1933, the corporate style will be, Great Western Steel Co., 2300 West 58th St., Chicago.

The entire personnel of both companies will be retained, making this the largest individual sheet steel source of its kind in the Middle West, with both carload and warehouse facilities.

Electric Metal Makers Form Association

There was organized at a meeting in Chicago on June 30 an association of electric metal makers, termed "the Electric Metal Makers Guild."

H. B. Schulz, of Illinois Steel Co., was elected president, A. E. Kayes, of the International Nickel Co., vice-president and Joseph A. Scott, of the Driver-Harris Co., secretary-treasurer.

The guild is open for membership to any man who earns his livelihood making metals in electric melting furnaces. Application for membership may be forwarded to any officer of the guild, preferably Joseph A. Scott at his home address 166 Tappan Ave., Belleville, N. J.

British Busy on Billets and Bars, Tin Plates Unsteady

LONDON, ENGLAND, July 11 (*By Cable*). — Merchandising procedure and prices have not as yet been satisfactorily ironed out by the International Raw Steel Cartel and as a result, the expected announcement of c.i.f. prices has not been made this week. However, plates and one-eighth in. sheets for consumption in the United Kingdom have been given a differential of six shillings gold below the official export price. Conditions of sale are causing friction among importers.

The Continental Semi-Finished Steel Syndicate has sold 15,000 tons for the United Kingdom.

Sharp criticism and opposition are developing in connection with the proposed merger of Dorman, Long & Co., Ltd. and South Durham Steel & Iron Co., Ltd. The terms of the merger provide for the former company writing off over nine millions from its capital.

William Bair of Glasgow is to spend one million pounds on rebuilding the Gartsherrie blast furnaces and coke plant. The object is mainly to offset Indian competition.

British Prices f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£5	to	£5 7s. 6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	17s.	to	17s. 6d.
Steel bars, open-hearth	£7 17½s.	to	£8 7½s.
Beams, open-hrth.	£7 7½s.	to	£7 17½s.
Channels, open-hearth	£7 12½s.	to	£8 2½s.
Angles, open-hearth	£7 7½s.	to	£7 17½s.
Black sheets, No. 24 gage	£9		
Galvanized sheets, No. 24 gage	£11	to	£11 10s.

Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

*Ingots	£2 5s.
*Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Black sheets, No. 31 gage, Japanese	£11 5s
*Steel bars, merchant	£3
*Sheet bars	£2 8s.
Plates, ¼ in. and up	£3 18s. 6d.
*Plates, 3/16 in. and 5 mm.	£4 1s.
*Sheets, ⅛ in.	£4 6s.
*Ship plates	£4 10s.
*Beams, Thomas	£2 16s. 6d.
*Angles (basis)	£3
Hoops and strip steel over 6-in. base	£3 12s. 6d.
Wire, plain, No. 8	£5 7s. 6d.
Wire nails	£5 15s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.

*Prices as established by European Raw Steel Cartel.

Pig iron is quiet, but Cleveland furnaces are well booked into September. Cleveland No. 3 foundry iron is being sold for export at 53s. 6d. f.o.b.

British steel works are busy on billets and sheet bars, and mills are fairly active on structural and railway steel. Tin plates are uncertain as to price because of the fall of tin and some works are finding specification difficult. Business is being done at 17s. basis i.c., f.o.b. works.

G. M. Sales Break Seasonal Trend Record

June sales of General Motors cars to consumers in the United States totaled 101,827 as against 85,969 in May, and 56,987 in June a year ago. This is the first time on record when General Motors sales to consumers for June have been higher than for May.

June sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 113,701 as against 98,205 in May, and 52,561 in June a year ago.

Farrel-Birmingham Raises Wages

Beginning Monday, July 10, all hourly wage rates in the Ansonia, Derby and Buffalo plants of the Farrel-Birmingham Co., Inc., are increased 10 per cent. The normal working hours will consist of five days of eight hours each, totaling 40 hours. The policy of the company, it is announced, will be to follow this schedule with as little overtime as possible.

The action of the company is in accordance with its desire to do its part in the task of providing work for more people and giving them more for their labor.

Cap Screw Makers To Draft Code

The United States Cap Screw Service Bureau, an organization of manufacturers of cap and set screws, has appointed a committee of eight to draft a code of practice for the cap and set screw industry under the National Industrial Recovery Act. H. D. North, president Ferry Cap & Set Screw Co., Cleveland, is chairman of the committee, and J. W. Fribley, president Cleveland Cap Screw Co., is vice-chairman of the committee which will work in conjunction with the Bureau's secretary, G. T. Byrne.

Attention, Architects and Building Engineers

Private architects and engineers will be engaged by the treasury department to prepare the plans and specifications for a large Federal building program which may reach a total of $200,000,000.

For the purpose of spreading employment as far as possible among architects and engineers who, preferably, have had some previous experience in public building work, Assistant-Secretary Robert has requested the cooperation of American Engineering Council and the American Institute of Architects in enrolling qualified individuals and firms. His purpose is to engage on every building architects and engineers resident in the State in which it will be erected.

Any qualified engineer desiring to participate in the Treasury Department's building program should send to L. W. Wallace, Executive Secretary, American Engineering Council, 744 Jackson Place, N. W., Washington, D. C., a complete statement, in duplicate, of his professional record, with a citation of significant references.

Alive to the desirability of having a clear understanding among all parties to the engagement of engineering advice on the Government building work, consulting engineers in New York discussed what steps should be taken at a luncheon meeting Tuesday. Some definite statement by the Government Administrator covering the percentage of the cost of a project to be accorded the engineering work is apparently what is desired.

A recent New York experience may have been a motivating cause for the conference. In the case of a housing project recently put under way in that city—one of the order of $800,000 or more—a bid of $4,500 for engineering services was obtained from what is described as a fly-by-night concern against a figure of $22,000 calculated by reputable firms experienced in the field as sufficient only to keep staffs intact.

Earle Gear Gets Bridge Machinery Contract

Earle Gear & Machine Co. has been awarded the contract for the operating machinery for the Harvey canal bridge, Route 2, Jefferson Parish, La.

This will consist of the complete operating machinery for a double leaf swing span, 95 ft. total span, and the machinery will weigh about 34,000 lb.

Announces a New Deep Drawing Steel

THE development of a new grade of deep-drawing sheet metal possessing unusual physical properties and of unusual importance to the metal stamping world was announced June 30 by Dr. Anson H. Hayes, director of the research laboratories of the American Rolling Mill Co., Middletown, Ohio.

In explaining the new product Doctor Hayes said: "The properties of mild steel sheets for deep drawing purposes have been discussed in detail by Griffis, Kenyon and Burns (The Aging of Mild Steel Sheets, American Iron and Steel Institute, 1933). The aging behavior of this material is reflected in the return of a sharp yield point when temper cold-rolled material is stored for sufficient lengths of time at room temperature or held at a higher temperature for shorter periods of time. The stretcher strains which accompany this offer a serious problem for the automobile body builder or other user of high-finish deep-drawing sheets, due to the impairment of the surface. There is also a loss in ductility which often increases the amount of breakage, especially in severe drawing operations.

"The research laboratories of the American Rolling Mill Co. have developed a material which is practically free from these disadvantages. In the dead-soft condition it will stretcher strain the same as ordinary mild steel, but this is prevented by small amounts of temper cold rolling and does not recur even after aging as long as one year at room temperature or 14 days at 212 deg. F. Fig. 1 shows a comparison of the stress-strain curves of ordinary mild steel and the new stabilized material after cold rolling 1 per cent and aging various lengths of time at room temperature. It is quite apparent that the aging treatment has not affected the shape of the stress-strain curves of the latter. There is no return of a sharp yield point and the material was completely free from stretcher strains in all cases.

"The new stabilized material has excellent drawing quality and in this respect is as good or better than mild steel sheets regularly supplied for the most severe deep drawing requirements. This new material possesses the further advantage over ordinary mild steel in that the amounts of cold rolling used for tempering the sheets does not impair the ductility. A comparison of the new material with mild-steel deep-drawing sheets in this respect is given in Fig. 2. This advantage is most important in case of very severe drawing requirements which ordinarily demand a very close adjustment of the amount of temper rolling to prevent breakage on the one hand and stretcher straining on the other.

"One of the great problems of any manufacturer is to maintain as high a degree of uniformity in his product as possible. This is particularly difficult in the sheet steel field. This was discussed in considerable detail by Thomas Dockray in a paper on 'Evaluation of the Drawing Quality of Extra Deep Drawing Sheets,' read at the Boston convention of the American Society for Steel Treating in 1932. As he pointed out, variations are not so much from heat to heat, but depend upon the position in the ingot.

"In this respect the new stabilized material differs greatly from commercial mild steel. It has a high degree of uniformity of all physical properties. Rockwell hardness and tensile tests have been made on a large number of these sheets. On a given lot of material, the deviation of these values is scarcely more than that attributable to the variations in the test itself.

"A close connection between aging and blue brittleness was demonstrated in 1919 by Fettweiss and has since been regarded as an established fact. It is of interest, therefore, to study the characteristics of the new sta-

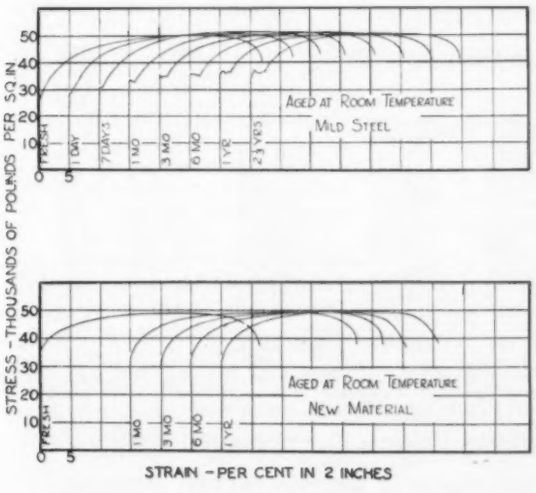


FIG. 1 (below)—In the case of the new material, no return of a sharp yield point was shown after ageing for various lengths of time at room temperature.

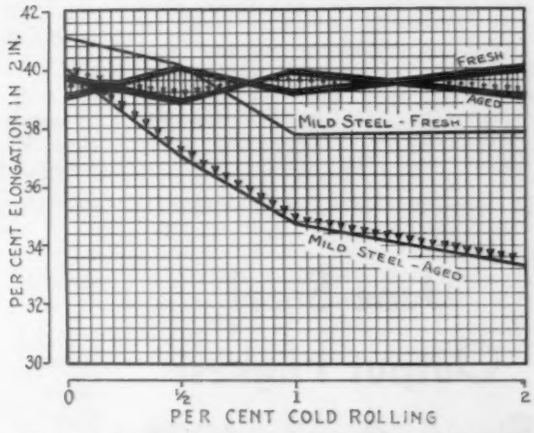


FIG. 2—The heavier curves show the sustained ductility performance of the new material under different degrees of cold-rolling, both fresh and aged.

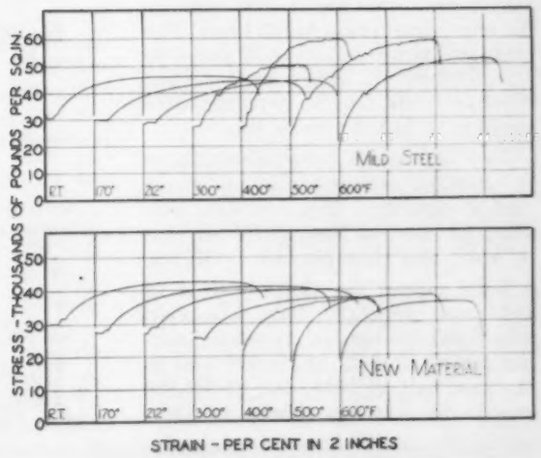


FIG. 3 (at right)—The stress-strain curves for the new material do not show jaggedness, a fact taken to indicate its freedom from so-called blue brittleness.

bilized material in the so-called 'blue brittle range.' Fig. 3 shows stress-strain curves of mild steel and the new material tested in tension at various temperatures. The marked difference between the two materials is readily apparent. The curves for ordinary mild steel are quite irregular in the blue brittle range due to the instantaneous changes of the physical properties of the material during the test. Each slight deformation of the test piece is followed by a very rapid change and intermittent slipping, and instantaneous increasing of tensile strength and hardness result in the irregular curve. Since the new material is entirely free from this 'blue brittleness,' the curves for it are free from this jaggedness.

"The blue brittle nature of ordinary mild steel is often illustrated by the increase in tensile strength in the blue brittle range. Fig. 4 shows the tensile strength of the new stabilized material in comparison with mild steel plotted against testing temperature.

"The higher strength of ordinary ferrous material in the blue brittle range is due to the instantaneous changes already mentioned. Were it not for this, it would be expected that the tensile strength would drop with increasing temperature due to increasing molecular mobility and consequent decrease in cohesive strength. Since the new material shows decreasing tensile strength with increasing temperature, it is free from blue brittleness."

OBITUARY

JOSEPH KENT SMITH, Metallurgical Engineer and consulting metallurgist for the Climax Molybdenum Co., New York, died July 8 at Battle Creek, Mich., after an illness of several weeks. Born in Liverpool, England, in 1869, he first came to the United States in 1906 to assist in the development of vanadium steel on which he had started experimental work in the late '90's. When the Vanadium Co. of America was organized, he was identified for three years with its laboratories. Returning to England in 1909, he engaged in research work on special alloys for the British Government. During the war he received from King George the Order of the British Empire. In 1925 he came to the United States again, aiding in the development of a process for making granular iron and becoming associated with the Climax Molybdenum Co.

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JOSEPH HYMAN, former partner of the Chicago iron and steel scrap firm of Hyman, Michaels & Co., died in Washington on July 5 at the home of his daughter. Mr. Hyman was 75 years old. He came to the United States from Germany when 21 years old. He went to Chicago and engaged in the scrap business. He retired a few years ago.

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FREDERICK BATES LOVEJOY, president, Wheelock, Lovejoy & Co., Cambridge, Mass., structural steel products, died at his home at Montclair, N. J., July 7, of a heart attack after a short illness. He was 70 years of age. Mr. Lovejoy was born at East Boston, Mass., and had been connected with the company since his boyhood.

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EMIL W. SIMON, production manager, Van Brunt Mfg. Co., Beaver Dam, Wis., agricultural tools, died June 27, aged 61 years. He came to America with his parents when he was an infant and had been identified with the Van Brunt interests 45 years.

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GEORGE WALTER MALONE, president of the C. A. Turner Co., Pittsburgh, iron and steel warehouse, died suddenly at his home in that city on June 30. He had been identified with the warehouse trade during the greater part of his business career, and was well known in the industry.

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LEWIS PFEIFF, traffic manager and director of the United States Steel Products Co. and vice-president of the Isthmian Steamship Co., died in New York on June 28, aged 64 years. Mr. Pfeiff had served the Steel Corporation and its subsidiaries for 44 years, having entered the employ of the Washburn & Moen Mfg. Co. in 1889. The latter merged with the American Steel & Wire Co., which in turn went into the organization of the United States Steel Corpn. in 1901. On the formation of the Steel Products company in 1903, Mr. Pfeiff was transferred to that company.

June Steel Output Highest Since April, 1931

STEEL ingot output in June, at 2,597,517 tons, scored the third consecutive monthly gain since March and was the largest tonnage for any month since April, 1931. The average daily production in June, as computed by the American Iron and Steel Institute, was 99,904 tons, compared with 74,148 tons in May.

June operations were calculated by the institute as representing 45.96 per cent of capacity. This compares with 34.11 per cent in May, 25.08 per cent in April, and 15.50 per cent in March.

Total output for the first half of 1933 was 8,989,192 tons, compared with 7,697,210 tons in the corresponding period of 1932; 15,258,519 tons in the first half of 1931, and 23,793,199 tons in the first six months of 1930.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported for 1933 by Companies Which Made 93.71 Per Cent of 1932 Ingot Output

1932	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	1,230,907	160,633	1,484,991	57,115	26	26.41
February	1,230,970	157,067	1,481,253	59,250	25	27.40
March	1,149,193	193,944	1,433,337	53,087	27	24.55
April	1,036,163	144,197	1,259,629	48,447	26	22.40
May	950,838	103,593	1,125,243	43,279	26	20.01
June	755,068	100,249	912,757	35,106	26	16.23
July	653,039	102,916	806,722	32,269	25	14.92
August	696,122	97,323	846,730	31,360	27	14.50
September	804,470	124,970	991,858	38,148	26	17.64
October	885,773	132,876	1,087,058	41,810	26	19.33
November	838,419	128,844	1,032,221	39,701	26	18.36
December	724,917	81,932	861,034	33,117	26	15.31
Total	10,955,879	1,528,544	13,322,833	42,701	312	19.75

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1931, of 67,473,630 gross tons for Bessemer and open-hearth steel ingots. Figures given for "Calculated Output," monthly and daily, are revised.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)
Reported for 1933 by Companies Which Made 96.57 Per Cent of 1932 Ingot Output

1933	Open-Hearth	Bessemer	Calculated Output All Companies: Monthly	Calculated Output All Companies: Daily	No. of Working Days	Per Cent Operation
January	885,743	109,000	1,030,075	39,618	26	18.23
February	922,806	126,781	1,086,867	45,286	24	20.83
March	784,168	94,509	909,886	33,699	27	15.50
April	1,180,893	135,217	1,362,856	54,514	25	25.08
May	1,716,482	216,841	2,001,991	74,148	27	34.11
June	2,211,657	296,765	2,597,517	99,904	26	45.96
Six Months	7,701,749	979,113	8,989,192	57,995	155	26.68

The figures of "per cent of operation" are based on the annual capacity as of Dec. 31, 1932, of 67,386,130 gross tons for Bessemer and open-hearth steel ingots.

All monthly production figures except for June, 1933, are revised. All "Calculated Output," and operating percentages except for June, 1933, are adjusted and revised.

THIS WEEK IN WASHINGTON

Storm Clouds Gather at Washington

Aggressive Action by Union Leaders Cools Industry's Desire to Codify

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, July 11.—Delay of basic industries in submitting codes of fair competition to the National Recovery Administration is the cause of growing concern. Intensified efforts are being inaugurated by the Administration to speed action by industries. The publicity drive in this direction is to be increased. It will also be the aim to "sell" the American public on the idea that unless the codes are submitted and the "government-business" partnership put into operation soon serious danger lies ahead.

On the surface the nervousness felt over the situation is not so marked as it is under the surface. At that, however, General Hugh S. Johnson, administrator of the National Recovery Act, has not hesitated to warn against the growing spread between the production curve and the purchasing power curve. He has made a grave forecast as to what will happen unless buying power is built up soon. The President's attention has been directed to the situation and he may make an appeal to industry to rush codes and speed up employment with its increased purchasing power.

There are reports that some Administration officials have become so disturbed that they had suggested that the President turn to drastic measures by way of drawing up codes himself and forcing industry to operate under them. Such a sweeping move, however, has been successfully opposed so far. It is realized that it might have extremely serious consequences. The act grants such power to the President, but from the outset the attitude of the Government is to get voluntary cooperation from business, to act in "partnership" with it, and not to attempt "czaristic control" of industry. That, it is seen, would halt business activity and employment and bring on consternation.

General Johnson has repeatedly said that steel and other basic industries are working diligently on codes, and has spoken of going over the code of the American Iron and Steel Institute. He had expected it to be filed last week. At present he apparently does not know when it will be submitted. There are some other basic industries also which have delayed, beyond what had been expected, the filing of the codes and it is reported they are becoming increasingly reluctant to do so.

Union Aggression Making Employers Cautious

There appear to be two chief reasons for some of these delays, after making allowance for the complications steel and other large industries face in preparing a workable basic code. The outstanding reason appears to resolve itself into the old contest between the open shop and organized labor. The other reason is said to be based on the feeling of some industrialists that business had finally started on its upward swing and is now capable of moving under its own momentum. Included in these industrialists are some who are opposed to fixing of minimum wages and who share the fear of unionization of industry. Despite efforts of the National Recovery Administration to allay fears of unionization, the fear of it persists, and even grows in view of the widespread activity of organized labor in all fields of industrial activity to unionize workers.

The upturn in business activity, in the opinion of many Government officials, really is due to considerable extent to the National Recovery Act. It is contended that anticipation of higher wages has forced a great deal of production at the lower existing levels.

MEANWHILE some prices, especially of foodstuffs, are moving upward swiftly, and helping keep down the purchasing power line while the production curve rises. Moreover, in other lines, such as cotton textiles, the Administration thinks that there is much speculative buying and that goods are being stocked. This, it is contended by some, is being done before wages are increased in order that greater profits may be netted. On the other hand, there is a school of thought that goods will be stocked only to develop losses unless wages are lifted up so that purchasing power will be created to take the goods.

"If we get too far ahead of our purchasing power it will mean a new collapse," General Johnson said at a press conference last Friday. "I shudder to think what would happen in this country if we had another. I don't like to be a prophet—if there was a new crash in this country I don't know what would happen. Now, here is a plan so that these industries can prevent runaway price structures. It is at least an experiment."

Whereas previously General Johnson had predicted the submission of the steel code before the end of last week, he found himself at this time unable to indicate when it would be ready.

"I think they have one almost ready at present," he declared. "I can't tell. It's up to them. It comes down to this — these codes constitute the preparation of a constitution for self-government of an industry and it takes some time to do it. They have

to compose differences within their family, and in each one of these great families. I happen to know in the steel industry they have been working almost continously to try to get something that they can all agree to. I can realize the public's impatience about the codes not coming in faster, but if you were sitting where I am sitting you would understand the situation. The reason the textile code came in so soon was that in a more or less tentative way we have been working with these people since last March. We talked with them before the passage of the agricultural bill. A lot of these other industries did not start until this law was close to passage or soon after. I think they are getting together as fast as possible."

Richberg Aroused Antagonism

THE attitude shown by General Johnson toward industries whose codes had been expected some time ago is more lenient than that shown by some other officials, especially in discussions not meant for public consumption. It is also true that this feeling of irritation is not directed solely to industry. It is also directed to organized labor. Organized labor is being held responsible for much of the delay because of its bold moves to unionize industry. Nor was industry encouraged any by the address of Donald R. Richberg, general counsel for the National Recovery Administration, before the Merchants' Association of New York last Thursday. Industrialists feel that, though Mr. Richberg, former counsel for railroad brotherhoods, ostensibly sought to assure them that the National Recovery Act did not deprive them of constitutional rights, in reality he held them responsible for the depression. Mr. Richberg left industry with a critical feeling. His position was held to be arbitrary and unsound in a number of respects.

One of his statements which aroused resentment was:

"If this adventure should fail, it will not be a failure of government; it will be the failure of an industrial system which the Industrial Recovery Act seeks to improve in order that its value may be preserved. It will mean, either that the system is fundamentally unsound, or that the present managers of private industry are incapable of operating it successfully.".

Nor did General Johnson agree with all Mr. Richberg said. The general was asked if he agreed with Mr. Richberg that this is industry's "last stand."

"I would think that that would be an extreme statement," replied General Johnson. "I wouldn't say that it was anybody's last stand until this is all over."

General Johnson's attention also was directed to Mr. Richberg's statement that acceptance of the act by industry would test out whether industry or the public henceforth would elect the management of business.

"I wish I had paid a little more attention to his speech," General Johnson replied. "I saw the manuscript a few days ago."

There is no doubt, however, that Mr. Richberg expressed the view of not only General Johnson but President Roosevelt as well when he pressed for action in filing codes. General Johnson has said from the outset that success or failure of the law would be determined within 60 days. One-half of that period has gone by and only one basic code has been the object of hearings.

Cummings Warns Industry

ATTORNEY GENERAL HOMER CUMMINGS also took occasion to warn industry that it is not exempt from the anti-trust laws under the National Recovery Act. His point was that while the National Recovery Act provides exemption of certain conduct under codes that have been approved there is a large field to which the anti-trust laws apply irrespective of codes. The Attorney General said information had reached the Department that sundry groups are already making and attempting to carry into effect improper restrictive agreements. He did not specify agreements he had in mind, though it is reported that one relates to fixing of prices of bread and other foodstuffs.

Charts laid before President Roosevelt showing that production is increasing more rapidly than purchasing power and employment are said to be giving him considerable concern. Steps are reported to be under consideration by him to check overproduction. The "restrictive agreements" of which Attorney General Cummings spoke are reported to be a factor in checking the purchasing power line and whether he will link these two elements was not made known. The general view is that the President wants to move carefully and not to take any drastic action that may be avoided. Nevertheless, it has been stated that if he feels he has to strike he will strike forcefully.

Labor Tension Grows

Coming on top of this growing feeling of apprehension that over-production and speculative buying are reaching serious points was the growing tension between organized labor and the open shop. General Johnson as a result issued a statement apparently aimed to stop what has been called a vigorous move on the part of organized labor to unionize industry and on the part of industry to build up company unions.

"Circulars and other literature purporting to come from labor union agents have intimated or openly stated that it is the purpose of the National Recovery Act and Administration to unionize labor or that the only way labor can secure benefits under the act is to join this or that union.

"Similar statements purporting to come from industrial concerns have intimated that this or that newly formed company union is the only organization through which labor can get a fair deal under this act.

"Both statements are incorrect and such erroneous statements of the act and its administration tend to foment misunderstanding and discord.

"It is the duty of this Administration to see that all labor—organized as well as unorganized—gets a square deal, and the Administration is organized to do and will do that duty."

General Johnson pointed out that it is the duty of the Administration to require the inclusion in codes of mandatory conditions of the section permitting employees the right of collective bargaining by representatives of their own choosing.

He then added:

"Labor in any industry has the right to organize and bargain collectively; the law also recognizes the right of individual workers to bargain for their own conditions of employment. But in the execution of this new social policy to which the Government stands committed, it is the obligation of the National Recovery Administration to require the payment of living wages by industry as a condition of continued existence and to prevent excessive and unreasonable disparities, in the interest of both social justice and a balanced economy.

"Collective bargaining under adequate government sanction and supervision should hold no fears for the fair-minded industrialist; on the other hand, the National Recovery Administration pledges itself through its Labor Advisory Board to obtain a fair deal for labor in any industry presenting a code, whether the employees are organized or not. It is not the function or the purpose of the Administrator to organize either industry or labor."

Almost immediately after issuing this statement, General Johnson spoke for the first time since becoming National Recovery Administrator before a joint conference of union officials and producers. It was a meeting of northern union coal operators with President John L. Lewis and other members of the United Mine Workers Union. Lewis suggested that a code for the bituminous coal industry provide for a minimum wage of $5 a day for a 6-hr. day and a 30-hr. week.

Operators of non-union coal mines are strongly fighting unionization and in some quarters it has been stated they are resisting the submitting of a code to the National Recovery Administration.

Industry Wants to Know What It Faces

By G. L. LACHER

A LARGE group of business men gathered at Hotel Astor, New York, last Thursday to listen to Donald R. Richberg, general counsel of the National Industrial Recovery Administration. They sought enlightenment. But the speaker had not gone very far when it became evident that he was less interested in enlightening his hearers than in censuring and threatening them.

On such an important point as the effect of the recovery act on constitutional rights Mr. Richberg was as ambiguous as a Delphic oracle. In one breath he said, "All the time-honored constitutional rights of the individual remain unmodified by this law," and in another breath, "There exists no constitutional right to do anything which is forbidden by this law."

Failing to explain just what is "forbidden" by the act, he left his hearers as much in the dark as they were when they came. In an attempt to belittle their fears, he inveighed against premature protests against "rules of the game" which they themselves would write. But he failed to mention one rule which authors of a code can have no part in writing. That rule is the labor clause in the Industrial Recovery Act.

It is precisely because of doubt as to the implications of this section of the law that the individual industrialist is concerned about his constitutional prerogatives. He expected Mr. Richberg to state plainly whether the signing of a code, under the new law, constitutes an abrogation of the constitutional right to deal with labor freely. He did not get an answer to this question. As a consequence, he is even more disturbed than before, particularly in view of Mr. Richberg's long previous affiliation with organized labor.

A Time for Candor

American industry is ready and willing to support President Roosevelt in his admirable effort to promote business recovery, but it has a right to know just what its status will be under the "new deal." Must it accept union domination as the price of greater price stability? If so, let that be stated with the utmost candor. It is no time for quibbling or equivocation. Industry faces a major change in its orientation and wants to know where it is headed.

And no doubt the American people at large would like to have this question clarified. This country is not a labor union country. Only a minor proportion of its workers are organized. It has no important labor or socialist party. It did not vote in the last election for labor domination in industry or in politics.

In this respect the United States differs from other countries, where labor movements have, at times, gained great power. In Italy, for example, labor seized manufacturing plants and made such a bad job of running them as to make the rise of Fascism certain. In Germany labor was politically dominant for years after the armistice, and so overburdened the State with social charges and bureaucratic expenses that dictatorship became inevitable. England has had two Labor governments since the war and neither proved successful. Must the United States go through this same phase before it learns by experience, or are the fears of industry without foundation?

The tone of Mr. Richberg's address indicates that, in his eyes at least, business is thoroughly discredited and has no right to ask this question. In blunt language he intimated that business must mutely take the medicine now offered or suffer a worse fate later on. Unless "planned economy," as now prescribed, is quickly and willingly accepted, he warned, "the advance of political control over private industry is inevitable." In other words, Government ownership and operation represent the final alternative.

Is "Economic Planning" Feasible?

It is remarkable how commonly advocates of planned economy point to socialization of production as the ultimate stage of the evolution of business. Certainly nothing in human experience, least of all the Russian experiment, justifies faith in an extension of Government control of production. And finally "economic planning" itself, impressive as it sounds, has not been proved feasible or necessary.

First of all, the thesis that the depression was due to a lack of planning has been exploded. Economic maladjustments are normal, not abnormal. In a dynamic society there is bound to be some overexpansion of capacity, some unsettlement of trade currents, some waste of capital. Such losses are the price of growth. Automobiles come in and carriage and wagon business suffers. Radios come in and piano production is hit. Women diet and bread consumption drops. Cellophane is invented and foil wrappings disappear.

Change is the only permanent thing in business life, and it inevitably causes dislocations and losses at the same time that it stimulates new enterprises and profits.

Depression Not Due to Overproduction

Undoubtedly economic losses were accentuated by the disrupting effects of the world war, but it nevertheless cannot be charged that our basic difficulty was overproduction. Studies by Prof. G. F. Warren of Cornell University show that in the 75 years before the war, world production of all basic commodities, *in physical volume*, increased 3.15 per cent per year. Since 1915, the rate has been distinctly less. And the *per capita* gain likewise has been at a slower rate. In the United States, total production of all commodities per head in the 75 years before the war rose at the rate of 1.73 per cent a year, but from 1915 to 1929 increased only 0.64 per cent.

Industrial "planners" have another guess coming if they think that industry brought on the depression by overproducing. And any "plan" which would so petrify present methods of manufacturing as to prevent the introduction of improved equipment, new processes or new products would perpetuate rather than dissipate industrial stagnation.

Industry can be—and in fact is—wholly sympathetic with the Administration's desire to spread employment and raise wages, without subscribing to unionization or planned economy. Planning there has been and there can be in the future, but it must be flexible and limited to proximate and specific objectives. It cannot be all-embracing or rigid in a field so changeable as the business of purveying factory goods to a discriminating and capricious public. Broad-scale planning in the sphere of money, finance, agriculture, or governmental expenditures may be feasible. But that is another story.

Department of Justice Resurrects Aluminum, Steel Rail Issues

WASHINGTON, July 11.—Alleged stability of steel prices during the past three years of the depression are being given consideration by the Department of Justice, according to Attorney General Cummings. So are prices of aluminum. It is the contention of the Department that these prices have remained comparatively stable while prices of other commodities have fallen. The Attorney General said that decision on beginning suits against the United States Steel Corpn. and the Aluminum Co. of America under the anti-trust laws will be made within the next two or three months. In the case of steel he did not make clear why one producer would be brought into the case any more than another, assuming that any is made the object of government action so often threatened but almost as often dropped because no reason for action was found.

The Attorney General also said the so called fixed price of steel rails is being given consideration and may be brought to the attention of the National Recovery Administration in connection with a code of fair competition in the steel industry. Also it was said the facts would be made available to Railroad Coordinator Joseph B. Eastman, who in the past as a member of the Interstate Commerce Commission has condemned the single price on steel rails. Mr. Eastman of course has no legal connection with rail prices. It is an old story, and Attorney General Cummings in speaking of the steel rail investigation begun some two years ago upon complaint of Senator Couzens of Michigan said it "dragged its way along like the snake in the poem." The Attorney General said also he was making inquiry as to reports of an "accord" between American and European railmakers as to prices.

The alleged stability of steel prices during the depression often has been the source of discussion, written and oral, by economists and others. Just why it should come up for the attention of the Department of Justice at this time, when the Department of Commerce and the National Recovery Administration are earnestly seeking to join "partnership" with industry now trying to emerge from the red was not made clear.

Actually the composite finished steel price dropped from 2.297c. per pound in 1929 to 1.957c. in 1932, a fall of 0.340c. while the present price of 1.973c. is a decline of 0.324c. under the 1929 level. Relatively the decrease may be considered small, but the significance is not in the decline but in the comparatively low level at which prices held in 1929 despite the heavy demand in this year which saw the largest steel production of all times. Other commodities showed much sharper rises.

The steel rail price was dropped $3 per gross ton to $40 last year, or to the equivalent of 1.785c. per pound, below the composite average. Rails of course are a high grade product. They do not figure much in the market at this time, though showing improvement over 1932 when a basketful was sold to the carriers, the price being no factor.

Becker and Rastall to Stay in Commerce Dept.

WASHINGTON, July 11.—The personnel of the Iron and Steel Division, Bureau of Foreign and Domestic Commerce, has been reduced from eight to six under the economy drive of the administration. The reductions become effective July 15. Luther Becker remains as chief of the Iron and Steel Division. The Industrial Machinery Division absorbed the Agricultural Implements Division and the personnel of the two divisions has been reduced from 12 to six with Walter H. Rastall, formerly head of the Industrial Machinery, retained as head of the merged divisions. The Minerals Division personnel has been reduced from 17 to 10. The Foreign Construction division has been abolished. The Domestic Commerce division personnel has been cut from 133 to 27. In all the personnel of the Bureau of Foreign and Domestic Commerce has been reduced from 835 to 409, a slash of 426 employees. The Bureau of Standards has been greatly reduced in personnel and unless funds are available from industry there will be a marked falling off in research work of the Bureau for industry.

Last Minute Sales Leads

(Received too late for classification in our Plant Expansion Section)

Carteret Storage & Terminal Co., Inc., Carteret, N. J., recently organized by Chicago interests, has purchased 18-acre tract land from American Mineral Spirits Corpn., near mouth of Rahway River, for price of about $1,500,000, as site for new oil storage and distribution terminal. Plans are under way for initial units, steel tanks, pumping plant and other structures. Cost over $500,000 with equipment.

Norfolk & Western Railway Co., Roanoke, Va., asks bids until July 19 for 2500 steel riser plates (Contract Serial AA-633).

Muessel Brewing Co., South Bend, Ind., recently organized to take over local brewery of Christoph Muessel on 15-acre tract, plans additions and improvements to increase capacity to 200,000 bbl. a year. Company has arranged financing over $500,000, portion of fund to be used for work. D. Sherman Ellison is president.

City Council, Danville, Va., is arranging financing for $2,500,000 for new municipal hydroelectric generating plant on Dan River, Patrick County, with power dams, power plant, transmission lines, switching stations and other structures.

United States Engineer Office, P. O. Box 97, Memphis, Tenn., asks bids until July 18 for one forged steel, annealed, round shaft, 22 ft. 10 in. long (Circular 6).

Akron Brewing Co., Akron, Ohio, recently organized by T. S. Eichelberger, Akron, and associates, has let general contract to Carmichael Construction Co., Akron, for new plant. Cost about $300,000 with equipment.

Nashville, Chattanooga & St. Louis Railway, Nashville, Tenn., plans rebuilding of car repair shops at Marshall, Tex., recently damaged by fire. Loss over $100,000 with equipment.

Bureau of Reclamation, Denver, asks bids until July 20 for eight steel pressure gates, each 6 ft. x 7½ ft. high, with hydraulic hoists, semi-automatic hangers and accessories for Boulder Dam project (Specification 542).

Orange County Brewing Co., F. A. Linck, 917½ Dos Robles Place, Alhambra, Cal., head, recently organized, has purchased 4½-acre tract at Anaheim, Cal., for new plant. Cost over $175,000 with equipment.

Emge Packing Co., Fort Branch, Ind., will soon ask bids on general contract for one-story meat-packing plant and power house. Cost about $100,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Kingsbury Breweries Co., Ninth and Marshall Streets, Manitowoc, Wis., formerly Manitowoc Products Co., has plans for new additions to and improvements in present units. Cost over $100,000 with machinery. Edward A. Juul, Security Bank Building, Sheboygan, Wis., is architect. Daniel C. Bleser is president.

Board of District Commissioners, District Building, Washington, asks bids until July 17 for one electric-operated duplex vacuum pumping unit with accessories.

Wisconsin Power & Light Co., 122 West Washington Avenue, Madison, Wis., has placed contract with Jutton-Kelly Co., 828 North Broadway, Milwaukee, for extension of power dam on Wisconsin River at Prairie du Sac, Wis., at $226,921. Mead, Ward & Hunt, 115 South Carroll Street, Madison, are consulting engineers.

George H. Smith Steel Casting Co., 1320 South First Street, Milwaukee, has been reorganized, with Mrs. Emma P. Smith, widow of founder, as president to fill vacancy caused by death of F. E. Hinners last November. J. B. Marshall is vice-president and sales manager; W. J. Donnelly, secretary and general manager, and P. W. Kaufmann, treasurer. Corporation has disposed of its Trackson Co. division, manufacturing tractor parts and appliances, pipe laying equipment, dump wagons, etc., which business will be continued under direction of Walter H. Stiemke. Foundry company was established in 1898 by George H. Smith. Upon his death in 1912, Mr. Hinners succeeded him as president.

George J. Meyer Mfg. Co., Milwaukee, manufacturer of bottle washing and filling units for breweries and dairies, added 59 men to its force the past month, increasing payroll to 778, which is an all-time peak in employment. One shift is working 10 hr. and another 12 hr. daily

Fairbanks, Morse & Co., with main works in Beloit, Wis., has increased its factory payroll about 50 per cent and average hours of shop employment slightly more than 100 per cent, due to improved demand for its products.

▲▲▲ THIS WEEK ON THE ASSEMBLY LINE ▲▲▲

Motor Car Operations at High Rate; Makers Delayed in Getting Parts

DETROIT, July 11.

THE automobile industry is continuing its almost unprecedented performance of maintaining the production rate which prevailed during the latter part of June. In some cases it is paying the penalty of over-caution because inability to secure materials and parts has necessitated a temporary curtailment of operations. It is reported that the Cleveland plant of Fisher Body Corpn. is behind in its orders for both Chevrolet and Pontiac body stampings, while the Buick factory at Flint closed down the past week reputedly on account of delays in obtaining materials. It is impossible for purchasers to get certain models of popular makes of cars in less than three weeks, and even then they must take whatever color combinations have come off the assembly lines. The larger manufacturers are paying more attention than in several years to seeing that the stream of materials flowing into their plants is not interrupted.

Sales executives are in daily contact with field representatives to watch closely any fluctuation in retail demand. With the selling season so far advanced, they are eager to avoid turning out more cars than the market will absorb. It is a gamble to predict what operating rate will hold the latter part of July. At the moment the most that the industry expects is that July will equal June, but there is a growing feeling that the output for the month will be on the under side of June by a small margin. August should be a good month, especially now that the rise in commodity prices has expanded purchasing power in the agricultural districts. The most hopeful sign is the resumption of buying in parts of the country, such as the agricultural sections of the Middle West, which have long been almost a negligible factor in automobile retail sales. Even the most conservative estimates of motor car production in the last half of 1933 place the total at 800,000 units, compared with 520,427 in the same period of last year, and unless there is an unexpected setback in business recovery, assemblies may approach the million mark, or close to the figure for the first half of the year. Thus at the present writing assemblies for the entire current year are reasonably certain to be 1,800,000 units, and possibly may be stretched to 2,000,000 units, compared with 1,431,544 in 1932. It is likely therefore that the steel trade will get substantial tonnages from the automotive industry through the entire latter half of the year, although they naturally will not be sustained at the recent high volume.

Chevrolet's July schedule now stands at 77,000 units, with the final figure almost certain to be close to the June production of 81,573 units, which was more than double the output in June of last year. Despite the fact that assemblies last month rose to the highest point in two years, they were slightly less than actual retail sales. Chevrolet's domestic retail deliveries in June are understood to have exceeded 78,000 cars. Pontiac will make over 10,000 cars in July, but the Buick and Oldsmobile programs are said to be less than in June. Plymouth still is working toward a goal of 40,000 units this month, but it is doubtful whether the total output of the Chrysler Corpn. will reach 60,000 cars, as earlier contemplated. Graham shipped 3560 cars in the second quarter, as against 3004 in the same period of 1932. Reo sold 1032 cars in June. Plymouth made retail deliveries of 7515 cars in the week ended July 1, the best record in its history. During the same week Hudson-Essex sales were the best since July 11, 1931.

Motor Makers Out of the "Red"

THE industry has recently put itself on a profitable basis with the major companies showing sizable earnings for the second quarter. Although no figures are yet available, it is believed that General Motors earned 75c. to 80c. a share on its common stock and Chrysler more than wiped out its first quarter's losses. Ford is believed to have achieved economies in the last year whereby it can operate at a profit on 2000 cars a day.

Unless Buick's plans are changed, it will introduce its 1934 models about Sept. 1. It is said that no radical departures are contemplated in body design, chassis or engine. If Buick goes through with its program, it will mark a return to its custom, abandoned in 1931, of offering new models before the summer is ended. It also will terminate automatically the agreement of members of the National Automobile Chamber of Commerce whereby new lines were to be introduced only at the year-end. As a matter of fact, this agreement has never been rigidly observed. Plymouth, for example, made model changes in April of this year.

A well-known car maker in the medium-price field decided recently to institute radical changes in the design of its models for next year which would involve large expenditures for equipment. After surveying its market, it decided to play safe and hold back its developments until 1935. It felt that the trend back toward normal in the medium-price range would be slow and that it might find that its capital outlay for major changes next year would not be justified by retail demand. Therefore, its actual changes

will be just enough so that it can say that it has a new car. This does not mean, however, that some manufacturers are not prepared to spend large sums on 1934 alterations in design. One company is working on an automatic gear shift which it may put on its cars as standard equipment next year.

Detroit Notes

CHEVROLET has started a campaign aimed to prove that its steel-and-wood bodies are safer and more sound-proof than the all-steel bodies of competitive manufacturers. It is said that makers of cars with all-steel bodies have recently made considerable headway in sales on the basis of tne safety factor. Fisher Body has large investments in lumber mills and wood-working machinery and it naturally would be disadvantageous for it to go over to an all-steel body. Incidentally, the amount of steel required for a combination steel-and-wood body is only slightly less than for an all-steel body . . . . Murray Corpn. has increased its steel barrel output to 4500 units a day and expects shortly to be making 5000 daily. It likewise is building about 1200 Ford truck frames a week. . . . . Motor Wheel Corpn. has started production of its new steel barrel. . . . . Cadillac is engaged in rearranging its manufacturing facilities so as to concentrate operations in a smaller area. This is said to include an assembly set-up for certain major units which resembles a wheel. The assembly is done on an oval-shaped conveyor corresponding to the rim of the wheel and sub-assemblies, arranged similar to the spokes, feed into the main assembly line . . . . The employment index of the local Board of Commerce stood at 60.7 on June 30, compared with 52.5 on May 31 and 72.2 on June 30, 1932.

Detroit Union Drive Makes Small Headway

DETROIT, July 11.—The drive of the American Federation of Labor to unionize the metal-working industry in metropolitan Detroit is in full swing. The program, being directed by three members of the organizing staff of President William A. Green, is to enlist all workers in one union, whether they be automobile plant or steel mill employees. After this organization has been established, it is proposed to assign the members to the regularly established unions according to trades. In other words, the one big union cutting horizontally across all trades is designed as a temporary expedient to induce workers to come under one roof, and then they will be put into the vertical unions based on crafts.

Working at cross purposes with the Federation is the Auto Workers Union, which is dominated at present by Communists. This union is said to number about 1500 members, although during the Briggs strike its enrollment rose temporarily to perhaps 6000. Its history runs back some 15 years, but it never has attained influence among the rank and file of automobile workers. The Federation, which is strictly barring the radical elements, is conducting an aggressive campaign by posters, handbills, letters and personal solicitation, but thus far is reported to have made little headway.

Motor Car Makers Are Buying Tools

DETROIT, July 11.—The local machine tool trade is much encouraged at the turn of events during the last month. Purchases of the Chrysler Corpn. have continued, an order for $40,000 worth of equipment having been placed with a Mid-west builder. Some of the tools are for the local Dodge plant and some for Chrysler's Newcastle, Ind., plant. One of the largest automobile companies is reported to be preparing to spend large sums in August for machine tools for 1934 models. Another maker, which has bought few tools for at least five years, is said to be planning sizable purchases. The Hall Mfg. Co., Toledo, has been awarded a contract by the Ford Motor Co. for the installation of its new eccentric valve seat grinder in every Ford service station in the world. The contract amounts to more than $1,000,000. The Hall company has added 50 workers to its present force of 80 to take care of this business. Machine tool inquiries are in much larger volume than at any previous time this year.

... PERSONALS ...

FREDERICK H. PAYNE

FREDERICK H. PAYNE, who resigned in May, 1930, as chairman of the board of the Greenfield Tap & Die Corpn. to become Assistant Secretary of War, has resumed his old post with the company. Colonel Payne organized the company in 1912 and was made president in 1919.

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A. F. FIFIELD has been elected president of the American Fork & Hoe Co., Cleveland, to succeed GEORGE B. DURELL, one of the founders of the company who has been president for 10 years and who has become chairman of the board. Mr. Fifield for a number of years has been in charge of the company's railway appliance division.

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W. W. COLEMAN, president, Bucyrus-Erie Co., South Milwaukee, Wis., has returned from Europe, where he spent three months on a tour of business observation, including a stay at the company's British affiliate, Ruston-Bucyrus, Ltd.

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L. W. SHEEHY has been appointed New England sales representative of the Ex-Cell-O Aircraft & Tool Corpn., Detroit, with headquarters at 51 Washington Avenue, Cranston, R. I. He will handle the products of the Continental Tool Works and Krueger-Wayne Tool Co. divisions of the Ex-Cell-O company as well as products carrying the Ex-Cell-O name.

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E. P. BARNES, heretofore supervisor of welding of the Moloney Electric Co., St. Louis, has become identified with the Modern Engineering Co., also of that city.

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F. A. MOESCHL, vice-president of the Newport Rolling Mill Co., has been reelected a member of the board of trustees of the Porcelain Enamel Institute.

Machinery Dealers Reorganize

On and after July 1, the Buffalo, Rochester, and Syracuse Offices of Crane-Schiefer-Owens, Inc., will operate independently, as follows:

R. L. Crane Machinery Co., Buffalo, N. Y.

F. W. Schiefer Machinery Co., Rochester, N. Y.

J. F. Owens Machinery Co., Syracuse, N. Y.

The personnel and organization will continue the same in the future as in the past with the three offices cooperating closely to promote the interests of the manufacturers and there will be no change in their present agency arrangements.

Nira, Versus the Constitution

Waiving of Constitutional Rights Involved in Code Acceptance Calls for Serious Consideration

By PHILIP R. VAN DUYNE
President, Meeker Foundry Co.

INDUSTRY has been accused of hesitancy to avail itself of the privileges of the National Industrial Recovery Act and its intensive study of the uncharted course has been called delay.

While making great efforts to cooperate with the President and to understand an economic theory which tells us that we should all do less work and all receive more pay, we are told by the general counsel of the National Recovery Administration that we are about to fumble our great opportunity, and that unless the private owners sufficiently socialize industry, a political socialization will be enforced. Has Nira transformed us into a socialistic and soviet republic? Has the Constitution of the United States ceased to exist?

Mr. Richberg gives us good reason to pause and examine the advantages and disadvantages of Nira and to seek information with respect to the United States Constitution.

The Recovery Act does *not* allow manufacturers to agree upon price control. The act does *not* suspend the operation of the Anti-Trust laws, it merely exempts from their provisions for a limited period any action complying with the provisions of any code, agreement or license, which has been approved or prescribed by the President. The act does *not* define cut throat competition or unfair competitive practices. The act makes no mention of not selling below cost. General Johnson has said that we are not to sell below cost but has not publicly told us whether cost has its legal meaning of actual cost for each individual plant for each separate month or is to be a cost based on the average per cent production for each industry for each separate month or quarter.

Constitutional Provisions

Before considering what Nira does contain, a brief statement of constitutional law is necessary to understand the reason for the peculiar structure of the act. Congress derives its power to legislate on this subject, if at all, from that provision of the Constitution authorizing it to regulate interstate and foreign commerce, namely:

The Congress shall have power * * * * * * * * * * * To regulate Commerce with foreign nations, and among the several states, and with the Indian Tribes.

The fifth amendment of the Constitution, however, limits the powers of Congress as follows:

No person shall * * * be deprived of life, liberty or property without due process of law; nor shall private property be taken for public use without just compensation.

The following excerpts from opinions of the United States Supreme Court cases suggest that industry is only reasonable when it gives careful study to the effects of Nira.

The case of Hammer vs. Dagenhart, 247 U. S., 251, setting aside the first Federal Child Labor -Law, contains the following:

The grant of power to Congress over the subject of interstate commerce was to enable it to regulate such commerce and not to give it authority to control the states in their exercise of the police power over local trade and manufacturers.

Bailey vs. Drexel Furniture Company, 259 U. S., 20, sets aside the second Federal Child Labor Law and includes the following paragraphs:

Grant the validity of this law and all that Congress would need to do hereafter in seeking to take over to its control any one of the great number of subjects of public interest, jurisdiction of which the states have never parted with and which are reserved to them by the tenth amendment, would be to enact a detailed measure of complete regulation of the subject and enforce it by a so-called tax upon departures from it. To give such magic to the word tax would be to break down all constitutional limitations of the powers of Congress and completely wipe out the sovereignty of the states * * * * *

In our view the necessary effect of this act is by means of a prohibition against the movement in interstate commerce of ordinary commercial commodities to regulate the hours of labor of children in factories and mines within the state, a purely state authority.

So here the so-called tax is a penalty to coerce people of a state to act as Congress wishes them to act in respect of a matter completely the business of the state government under the Federal Constitution.

D. L. and W. Railroad Company vs. Yurkonis, 238 U. S., 439.

The mere fact that the coal might be or was intended to be used in the conduct of interstate commerce after the same was mined and transported, did not make the injury one received by the plaintiff while he was engaged in interstate commerce.

This case was cited in the case of Champlin Refinishing Company vs. Oklahoma a Federal, not a Supreme Court case reported in 51 Federal Reporter 2nd series, 823, where the opinion is as follows:

"The production of oil is analogous to the manufacture of goods or the mining of coal, neither is interstate commerce although the product may be later shipped to other states.

Hitchman Coal & Coke Company vs. Mitchell, 245 U. S., 229.

Whatever may be the advantages of "collective bargaining" it is not bargaining at all in any sense unless it is voluntary on both sides. The same liberty which enables men to form unions, and through the unions to enter into agreement with employers willing to agree, entitles other men to remain independent of the union and other employers to agree with them to employ no man who owes allegiance or obligation to the union. In the latter case as in the former the parties are entitled to be protected by the law in the enjoyment of the benefits of any lawful agreement they may make.

Adair vs. United States, 208 U. S., 161.

The right of a person to sell his labor upon such terms as he deems proper is in its essence the same as the right of the purchaser of labor to prescribe the conditions upon which he will accept such labor from the person offering to sell. In all such particulars the employer and employee have equality of right and any legislation that disturbs that equality is an arbitrary interference with the liberty of contract which no government can legally justify in a free land.

United States vs. Chicago, etc., Rail-

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NEWSPAPER reports have emphasized the impatience of administration authorities at the delay in submitting codes under the terms of the National Industrial Recovery Act.

To the layman, the production of a code for a given industry may seem like a simple matter and one that could be quickly dispatched. The industrialists who have been at work day and night for the past month, endeavoring to formulate agreements that will be fair to employees, the public and themselves have found that the task is a difficult one, involving many serious considerations.

One of the most important of these is the question of what effect code agreements will have on our long established and hitherto inviolate property rights. The author, Mr. Van Duyne, a lawyer as well as an industrialist, discusses this important question.

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road Company, 282 U. S., 311, decided January 5, 1931.

The power to regulate commerce is not absolute but is subject to the limitations and guarantee of the Constitution among which are those providing that private property shall not be taken for public use without just compensation and that no person shall be deprived of life, liberty or property without due process of law.

THE recent case of Adkins vs. Childrens Hospital, 261 U. S., 525 sets aside as unconstitutional a Federal law fixing minimum wages for minors and women in the District of Columbia. This case reviews all important preceding cases and for that reason is of great importance.

Is it to be conceived that the drafters of the Recovery Act did not know of these cases, and that in drawing this act they did not try to circumvent them?

There is little doubt that members of any industry agreeing to a code have waived their constitutional rights, and it may be fair to assume that when 75 per cent of an industry agree to a code the other members of that industry will impliedly be bound by such code as a trade custom.

Briefly the National Recovery Administration now says to industry, "Sign codes waiving your constitutional rights and permitting political socialization, or the executive branch of the Government, that is the President will legislate against you; or will impose a licensing system," which licensing system abrogates the right of private contract and violates the fifth amendment. Industry might well assume that the Recovery Administration was addressing to it the words of a well known American case on coercion sufficient to render a contract void: "Sign them papers or get out of doors." Under present United States Supreme Court decisions the carrying out of either threat is unconstitutional.

Perhaps the most insidious provision of the entire act is section ten (b) which requires a provision to be inserted in any code agreed upon, whereby one contracting party must permit the other, after their minds have met, and after constitutional rights have been waived, to make any changes or modifications of the contract. Is it strange that the National Recovery Administration, with absolute power only after the approval of a voluntary code, urges industry to submit brief temporary codes including only maximum hours, minimum wages and the other mandatory provisions of the act?

INDUSTRY is not adverse to high wages and short hours. But can the National Recovery Administration persuade the consumers to enthusiastically accept higher prices? Ordinarily both the wages of labor and the price of goods are governed by the law of supply and demand; and business men probably know more than professors of economics about consumer reaction to higher prices in times of depression. They know by experience that no industrial employer can long pay wages from any source except the selling price of goods manufactured.

Act Favors Organized Labor

Industry would have accepted this new creature Nira with much greater welcome, had not the drafters of the act and Congress permitted union labor to climb aboard and insist that the national unions be buoyed up by the Government, industry and labor in general, in their combined effort to conquer unemployment.

Union labor obtains support in three definite respects, all appearing in section 7-A of the act, first in abolishing the "Yellow Dog contract" which is of very little concern, as in these days there are very few non-union plants, the remaining two, however, being extremely vital thrusts at the open shop. At the present time 90 per cent of industry, which manufactures for general sale at home and abroad, operates on the open shop basis.

The provision for collective bargaining has long been the aim of all labor unions and where it is effectual, with written contracts as the result, it is the *sine qua non* of the closed shop.

The provision that "the employees * * * shall be free from the interference, restraint or coercion of the employers of labor, or their agents, in the designation of such representatives, or in self-organization, or in other concerted activities for the purpose of collective bargaining or other mutual aid or protection" is the death knell of the company union. The phraseology sounds harmless but when we consider that a strike certainly is "a concerted activity for the purpose of collective bargaining" and that rules restricting production and all the different regulations enforced in the closed shop building trades are "for other mutual aid or protection," the threat of this section is apparent. What is not apparent is that the phrase "free from interference, restraint or coercion" is quite similar to that used in the Railway Labor Act of 1926, which was construed by the United States Supreme Court in the case of Texas and New Orleans Railroad Company vs. Brotherhood of Railway and Steamship Clerks, 281 U. S., 548 in which case Donald R. Richberg appeared as counsel for the Brotherhood. This case affirmed the granting of an injunction in favor of the Brotherhood against any activities of the Railroad Company in aiding and abetting the formation of a company union. So a national union desiring to organize a plant may to a large extent interfere, restrain and coerce the employees, but if the employer desires to combat these or other concerted activities he may be enjoined.

THE suggestion of certain manufacturers that code makers should insert in their codes reservations or contradictions of the mandatory clauses of the act is puerile, and certainly of no force, when we consider the right of the Recovery Administration to modify codes.

One other difficulty of the manufacturers is to figure how piece work or production incentive wage may be continued whenever the actual wage approaches the minimum provided in the code.

There are still many other unsolved problems such as intra-state competition, delay in imposing restrictions on imported goods, delay in obtaining vital code modifications necessary on account of changing business conditions, lack of knowledge of political appointees holding subordinate positions but making decisions.

The remaining mandatory provision is "that employers shall comply with the maximum hours of labor, minimum rates of pay *and other conditions of employment* approved or *prescribed* by the President," and this is the express waiver of constitutional rights.

The Advantages of Nira

IN conclusion, what are the advantages of Nira; first and foremost, no matter how bad or impractical it may be, if the majority of people, particularly from the viewpoint of consumers, think well of it, it will restore confidence and money will start circulating faster, the most certain sign and cause of returning prosperity. It will reduce the competitive disadvantage of those concerns which greatly increased their capacity during war and post-war periods without obtaining any data on normal demands for consumption, and by their heedlessness contributed to the depression. It may cause union labor to cease its advocacy of general anti-injunction laws. It will raise wages in certain industries where they are too low, and it will reduce hours of labor in some industries where they are too long, though Nira or the Department of Labor has no concern for that largest class of American workmen, in that industry which is now prospering, whose hours are longest and wages are lowest, the agricultural workmen or farm laborers. It, together with the Farm Inflation Act, have already gone far to change a buyers market for manufactured goods into a sellers market. It should give employment to many skillful and efficient workmen who are without work, without any fault of their own; it may also provide jobs for some of the unemployed whose inefficiency is fostered by charity and who only appreciate work for the shortest possible number of hours; and it may solve the controversy as to whether or not labor is a commodity.

Steel Ingot Production Rises to 59 Per Cent of Capacity

Cessation of Specifying Fails to Halt Rise in Output—Advances of $1 a Ton on Pig Iron Announced for Third Quarter

NEW business in iron and steel has shown an expected recession, following the heavy specifying that marked the close of the second quarter, but pressure for shipments is unrelaxed and ingot production has made a further gain, rising from 56 to 59 per cent of capacity. Output at Pittsburgh has increased from 45 to 49 per cent, the Chicago rate has advanced from 57 to 60 per cent, the Valley average has gone up from 55 to 65 per cent and Buffalo operations from 60 to 62 per cent.

Blast furnaces lighted include one steel company stack and one merchant unit in the Birmingham district and a steel works stack at Buffalo. Among furnaces scheduled to go into blast before the end of the month are one stack each at Buffalo, Cleveland and Toledo.

THE Steel Corporation's gain of 176,956 tons in unfilled orders in June undoubtedly reflected the heavy releases that flowed in at the end of last quarter. While many buyers may have anticipated their requirements further ahead than usual, it is unlikely that the amount of speculative tonnage ordered was excessive. Certainly steel going to the automobile industry is passing almost into immediate consumption and the same may be said of tin plate shipped to the can companies. Jobbers, in some cases, have been prevented from building up their inventories by unsatisfactory credit standing, and railroads have continued to purchase relatively unimportant tonnages. It is possible that considerable steel pipe has been stocked by both mills and jobbers, and reinforcing bar distributers have accumulated some steel. Structural steel fabricators, however, have not departed noticeably from their usual practice of covering their requirements for specific projects.

EVEN if the present lull in new purchases should continue, tonnage booked by the mills for July shipment is sufficient to maintain production at an undiminished rate through this month and part of August. But a renewed flow of specifications is assured before the close of July. Delay in announcing third quarter quotations, especially on bars, plates and shapes, forced mills to protect their larger customers through July at preferential prices. The elimination of such concessions under the third quarter contract prices announced last week will no doubt result in releases this month-end similar to those which marked the closing days of June.

Shipments to the motor car industry are undiminished, although Detroit is concerned both on account of a relaxation in demand for higher-priced cars and the aggressive efforts of union labor to organize automobile workers. Tin plate mills are booked into September at capacity. The brewing industry continues to take a comparatively large tonnage of steel for building extensions, tanks, barrels and beer cases. Structural steel awards, at 27,225 tons, were the third largest of the year, but included a single letting of 15,000 tons. Plate lettings totaled 7660 tons.

SUBSTANTIAL progress is being made in the completion of the steel industry's code, with the possibility that it may be ready for submission to the National Industrial Recovery Administration this week. A subsidiary code, that of pig iron producers, is being developed at a conference now in session at Chicago.

The pig iron trade, like the steel industry, has finally announced prices covering the full third quarter, after temporarily considering a month-to-month basis of quoting. New prices put into effect at Chicago represent an increase of $1 a ton. Advances of an equal amount have just been announced by producers in northern Ohio, eastern Pennsylvania, New England, the South and at Buffalo.

Other primary materials have increased in price. Furnace coke at Connellsville, which advanced 25c. a ton late in June, has again risen 25c., this time to $2.25 a ton. Scrap is advancing generally. Higher prices at Pittsburgh, Philadelphia and Chicago have raised THE IRON AGE composite price for heavy melting steel from $10.54 to $10.88 a gross ton. The pig iron composite, by virtue of the advance that has been put into effect at Chicago, has risen from $15.01 to $15.17 a gross ton. THE IRON AGE composite for finished steel is unchanged, although a number of products which are not constituents of the average are higher than a week ago. Commercial seamless boiler tubes, both cold-drawn and hot-rolled, have been advanced $8 to $12 a ton. Most makers of cold-rolled strip have now joined in the recent advance of $5 a ton to 2.25c. a lb., Pittsburgh or Cleveland. An upward price revision on manufacturers' wire may be made before the end of the month. An early advance on tin plate is also a possibility.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	July 11, 1933	July 5, 1933	June 13, 1933	July 12, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	$16.34	$16.34	$16.34	$14.34
No. 2, Valley furnace	15.50	15.50	15.50	14.50
No. 2 Southern, Cin'ti	16.51	16.51	16.51	13.82
No. 2, Birmingham	12.00	12.00	12.00	11.00
No. 2 foundry, Chicago*	**17.00**	16.00	16.00	15.50
Basic, del'd eastern Pa	16.09	16.09	16.09	15.50
Basic, Valley furnace	15.00	15.00	15.00	13.50
Valley Bessemer, del'd P'gh	17.89	17.89	17.89	16.89
Malleable, Chicago*	**17.00**	16.00	16.00	15.50
Malleable, Valley	15.50	15.50	15.50	14.50
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	82.00	82.00	68.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$40.00	$40.00	$40.00	$43.00
Light rails at mill	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	1.60	1.60	1.50	1.60
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.598	1.598	1.598	1.898
Structural shapes, P'gh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, P'gh	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh	1.60	1.60	1.55	1.45
Cold-rolled strips, Pittsburgh	**2.25**	2.00	2.00	2.00

Finished Steel

	July 11, 1933	July 5, 1933	June 13, 1933	July 12, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.25	2.25	2.10	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.35	2.35	2.20	2.30
Sheets, galv., No. 24, P'gh	2.85	2.85	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.95	2.95	2.80	2.95
Hot-rolled sheets, No. 10, P'gh	1.65	1.65	1.50	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.75	1.75	1.60	1.65
Wire nails, Pittsburgh	**2.10**	1.85	1.85	1.95
Wire nails, Chicago dist. mill	**2.15**	1.90	1.90	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	**2.60**	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill	**2.65**	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh	$4.25	$4.25	$4.25	$4.75

Old Material

Per Gross Ton:				
Heavy melting steel, P'gh	**$12.12½**	$11.75	$11.75	$8.25
Heavy melting steel, Phila	**10.25**	10.00	9.25	6.25
Heavy melting steel, Ch'go	**10.25**	9.87½	8.75	4.75
Carwheels, Chicago	9.50	9.50	9.50	5.50
Carwheels, Philadelphia	12.25	12.25	10.25	8.00
No. 1 cast, Pittsburgh	10.50	10.50	10.50	9.50
No. 1 cast, Philadelphia	**12.25**	10.25	10.25	8.00
No. 1 cast, Ch'go (net ton)	**10.50**	8.75	8.75	6.00
No. 1 RR. wrot., Phila	10.75	10.75	10.75	8.50
No. 1 RR. wrot., Ch'go (net)	6.50	6.50	6.50	3.75

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	**$2.25**	$2.00	$1.75	$2.00
Foundry coke, prompt	**3.00**	2.75	2.50	3.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	**8.75**	8.25	7.75	5.12½
Lake copper, New York	**9.00**	8.50	8.00	5.50
Tin (Straits), New York	*46.00*	46.50	46.00	21.12½
Zinc, East St. Louis	**4.85**	4.50	4.30	2.60
Zinc, New York	**5.22**	4.87	4.67	2.97
Lead, St. Louis	**4.35**	4.15	4.05	2.55
Lead, New York	**4.50**	4.30	4.20	2.70
Antimony (Asiatic), N. Y.	**9.00**	6.50	6.50	5.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

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▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
July 11, 1933	1.973c. a Lb.	$15.17 a Gross Ton	$10.88 a Gross Ton
One week ago	1.973c.	15.01	10.54
One month ago	1.892c.	15.01	9.92
One year ago	1.976c.	13.76	6.42
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1933	1.973c., July 5	1.867c., Apr. 18	$15.17, July 11	$13.56, Jan. 3	$10.88, July 11	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Ingot Output Now at 49 Per Cent Rate

Valley Production Also Higher, Reaching 65 Per Cent — Heavy Melting Scrap and Coke Advance in Price

PITTSBURGH, July 11.—Despite the fact that finished steel releases in this district have experienced some falling off from the high June level, most of the principal producers have advanced their operating rates and are apparently rather anxious to ship out tonnage specified against old contracts during June on sheets, strip steel and bars. June tonnage for July shipment was sufficient to maintain undiminished production in the current month and through a part of August. On tin plate, mills are booked into September at capacity. Delay in announcing third quarter quotations also forced many producers, particularly of bars, plates and shapes, to cover their customers through July at low prices, and as July 31 has now been set as the deadline for specifications against such contracts the present month may be similar to June in the placing of heavier tonnage during the last half.

Shipments to the automotive industry are undiminished, and the brewing group is still taking a comparatively large tonnage of steel for building extensions, tanks, barrels and beer cases. Miscellaneous manufacturing consumers continue active and shipments to jobbers are increasing. Structural steel awards have been more numerous recently, but Federal work is still lacking and most new projects call for only small tonnages. River barge orders booked in the last week will require at least 2500 tons of plates. Buying by the railroads is confined principally to miscellaneous lots for repair shops. But the Brazilian Government has ordered 38,000 tons of rails and accessories from the United States Steel Products Co., 20,000 to 25,000 tons of which will probably be rolled by the local mill.

Steel ingot production in the Pittsburgh district, which was checked last week, has again risen sharply and is estimated at 49 per cent of capacity. No additional blast furnaces have come in. Output in the Valleys and nearby northern Ohio plants has gained even more and will average 65 per cent this week. A considerable part of this increase is attributable to greater open-hearth and Bessemer activity on the part of the Steel Corporation. Steel output in the Wheeling territory is well sustained at 90 per cent of capacity.

Tin mill schedules have again been boosted to a near capacity rate, and sheet production for the industry as a whole is estimated at 55 to 60 per cent. Strip output is at 50 per cent and bar mills are engaged at only a slightly lower rate. Structural steel production has gained slightly.

No major price changes have come out in the last week, although seamless boiler tubes have been advanced $8 to $12 a ton. Third quarter prices announced at the beginning of the month have not been adequately tested, but quotations at lower levels on new business seem to have entirely disappeared. Current production and shipments of most finished steel products are at the old levels. On heavy hot-rolled products the reaffirmed 1.60c., Pittsburgh, price cannot be tested until next month, and there is still some confusion on sheets and strip steel because of July coverage at lower levels. Pig iron prices are very strong, and scrap has been advanced.

Pig Iron

Shipments continue heavy, and new orders are slightly heavier. The local merchant furnace is moving comparatively large tonnages of basic iron to non-integrated steel makers which it supplies. Prices are firm, but are being applied only to the immediate requirements of consumers, as sellers refuse to quote beyond July 31.

Semi-Finished Steel

Movement of billets, slabs and sheet bars to non-integrated sheet, strip and tin mills during June was the heaviest in nearly three years, and producers of semi-finished steel have had little opportunity to build up their inventories. Consumers are also having difficulty securing their immediate requirements in some instances. Forging billets are in steady demand and makers are taking third quarter business at $31, Pittsburgh. The price on re-rolling billets, slabs and sheet bars is firm at $26, although a little tonnage taken at slightly lower prices remains to be shipped this month. Wire rods are quoted at $35, Pittsburgh or Cleveland, but only for specification during July and shipment prior to Aug. 15.

Rails and Track Accessories

The local rail mill will receive a large share of an order for 38,000 tons of rails and accessories placed recently by the Brazilian Government with the United States Steel Products Co. No other sizable orders have been booked, and the mill continues to roll sheet bars. Specifications for accessories are well sustained, and prices are holding. Quotations on relaying rails have been advanced, and the 20 to 45-lb. size is now quoted at $25, Pittsburgh.

Bars, Plates and Shapes

The end of the quarter brought considerable activity in structural steel as contractors sought to take advantage of low prices then expiring. Nevertheless, most of the projects closed recently have been small, and the aggregate tonnage has not been sufficient to build up the backlogs of small fabricators. Rolling of steel for the San Francisco-Oakland bridge will soon begin in this district, and will extend over a long period. Initial fabrication will also begin at an early date. The barge market is more active, three lots of barges, requiring more than 2500 tons of plates, having been placed in the last week. Railroad purchases are still confined to steel for repair work, but miscellaneous orders for railroad shops are reaching mills in much better volume. Shipments of reinforcing bars are heavier, but large highway building projects have not got under way and, with a few exceptions, orders are small.

The minimum price of 1.60c., Pittsburgh, on bars, plates and shapes has not been thoroughly tested by large users who are protected through July at whatever concession from this price they enjoyed. All producers have announced that this tonnage must be specified by July 31 for shipment prior to Aug. 15. Elimination of the Detroit delivered price on bars is also being considered, and would advance quotations to consumers in that territory if the Pittsburgh base plus the full freight rate were applied. No change has been made in quotations on alloy steel bars, and the present range of 2.45c. to 2.65c., Pittsburgh, is being maintained on current orders.

Wire Products

New prices on merchant wire products have not been thoroughly tested, as many consumers are covered for the month of July at old levels. However, specifications against these contracts are likely to be heavy during the next two or three months because of the desire of jobbers to stock up as much as possible at the lower levels. The 2.10c., Pittsburgh, price on manufacturers' wire is well maintained, and some upward revision may be made before the end of the month. In the meantime, producers will take business only for July specification.

Tubular Goods

The price advance last week drove in considerable tonnage, and pipe production in the Pittsburgh and nearby districts is still fairly well maintained. Standard pipe is the most active product, although a little miscellaneous

line pipe inquiry has appeared. The Lycoming Gas Co. has again revived its inquiry for 2500 tons of pipe for an auxiliary line in New York State. Demand from the oil industry continues rather quiet. Quotations on commercial seamless boiler tubes, both cold drawn and hot rolled, have been advanced from $8 to $12 a ton by a reduction in discounts of four to six points. Revision in base discounts on lap-weld steel and charcoal iron boiler tubes is expected to follow in the near future. Mechanical tubing is unchanged.

Sheets

Releases were naturally lighter last week because of the holiday and the beginning of the third quarter. Many consumers have already ordered out more tonnage than they will actually need in the next few weeks, and mills expect to take their time in making shipments. At the current production rate of 55 to 60 per cent of capacity some sellers have sufficient backlogs to carry them well into August. A number of producers supplying high-finished sheets to the automotive industry are running full, and no evidence of abatement in the requirements of this important consumer are yet noticeable.

The new prices have not been thoroughly tested, but no new sales at lower levels are reported. Opposition to the comparatively high advance on light cold-rolled sheets is encountered in the automotive group, and one or two large interests had closed at the lower levels before the new prices were announced. The practice of selling cold-rolled sheets on a mill run basis is to be eliminated, but an advance of $4 a ton for assorted material is being asked, and the market is not definitely established.

Tin Plate

Operations have again approached the capacity rate, with several independent producers running extra turns. Hot weather continues to slow up production in many instances, and some makers have limited their capacity to 16 turns in an effort to steady schedules. Releases have shown no abatement because of the beginning of a new quarter, and many container makers are pressing for deliveries. Export shipments are running considerably ahead of the corresponding 1932 period, and recent sales indicate even larger gains. Improved buying by the oil industry is reported by a few makers.

Strip Steel

Although little new business has been taken at the 1.65c., Pittsburgh, price on hot-rolled strip, and the 2.25c., Pittsburgh or Cleveland, quotation on cold-rolled, all makers are now quoting these figures, and material is not available at less. In the meantime, shipments are still being made at lower levels, and a few large buyers are covered for this quarter at 1.60c. on hot-rolled and 2c. on cold-rolled strip. Cooperage stock has been marked up $2 a ton and is now quoted at the lower differential over hot-rolled strip. Production schedules are well sustained at at least 50 per cent of capacity, and mill backlogs are sufficient to promise little curtailment this month.

Coke and Coal

The coke market has gained further strength, and the foundry grade is not now available at less than $3 a ton, Connellsville. Furnace coke is quoted at $2.25 to $2.50, and scarcely any is available even at the higher figure. Many producers have had to suspend operations because of strikes, and a few operators have adopted the wage scale of the Frick company, which is even higher than union demands. Coal prices are fairly strong, although demand is no heavier.

Scrap

Purchase of 8000 to 10,000 tons of No. 1 heavy melting steel by a leading consumer at $12.25 has established the market at a higher level and definitely narrowed the range of quotations. Dealers are freely paying $12 to cover this order and in some cases the purchase price is being offered. Several sellers participated in the order, and most of them are anxious to get it off their books in anticipation of higher prices in the immediate future. The other steel-making grades are correspondingly strong, and one dealer is paying as high at $10 in the East for shipment to a point on the outskirts of the district. Odd lots in the immediate district are bringing only $9. The monthly list of the Pennsylvania Railroad, closing on July 12, contains 9400 tons, including only 1050 tons of No. 1 heavy melting steel.

Further Gain in Steel Output at Buffalo

BUFFALO, July 11.—The Republic Steel Corpn. has placed another furnace in blast, giving it two active stacks in this district. The Lackawanna plant of the Bethlehem Steel Corpn. is operating two, the Tonawanda Iron Corpn., one, and Port Colborne plant of the Canadian Furnace Co., Ltd., one. A Hanna furnace is due to go into blast the latter part of this month. New business is lighter. Furnaces are not pressing for orders, and most of the larger users have covered for the time being. Specifications are fairly good.

Steel

Buffalo district steel output went to 62 per cent this week, with 23 out of the 37 open-hearths operating. The Lackawanna plant of the Bethlehem Steel Corpn. is operating 16; Republic increased the number of its active furnaces from four to five, and Wickwire-Spencer from one to two. The Seneca sheet division of Bethlehem is operating at 75 per cent, and handling practically all of the business it can under present conditions. Only small jobs were reported in the fabricated structural and reinforcing bar fields.

Scrap

With outside markets soaring, the local market is sympathetically stronger. A Steubenville order for cast iron borings is attracting local tonnage, and as high as $6.75 is being paid for the available supply. Mills here are operating at a higher rate than last week, and it is believed to be only a question of a short time before consuming interests will be forced to buy. Dealers' price ideas are stronger each day. Some announce they will not sell No. 1 steel for less than $12, and $15 steel by the end of the summer is being talked of. Niagara Falls consumers are paying $7.50, delivered, for machine shop turnings.

Warehouse Prices Are Advanced on Coast

SAN FRANCISCO, July 10.—Warehouse prices at San Francisco followed the mill advance on sheets with new quotations of 3.95c. on hot-rolled No. 24, 3.33c. on No. 10, and 4.55c. on galvanized No. 24. Common wire nails have risen 10c., the second time in three weeks, to $2.65, base per keg in less-than-carload lots. Mill prices continue firm with no change in schedule announced during the week except on steel pipe.

The week was marked by the decided absence of inquiries or awards of any sizeable tonnage. However, it is reported that there are a greater number of pending projects involving minor tonnages than at any time in the last two years. This increase in private work, together with anticipated Federal activity, is heartening. Bids have been taken at Los Angeles for 2500 tons of plates and shapes for the Metropolitan Water District.

Scrap Advances in Detroit District

DETROIT, July 11.—Substantial purchases of steel and blast furnace scrap by the local mill in the last two weeks, estimated at about 55,000 tons, have given a buoyancy to the market which is reflected in higher prices. Heavy melting steel and hydraulic compressed sheets have advanced 50c. and 75c. a ton respectively, while other items are up 25c. to 50c. a ton. There also is a considerable movement of scrap to other steel-producing centers, particularly to the Canton-Massillon district.

Steel Output Reaches 60 Per Cent at Chicago

Shipments Against Contracts Are Heavy — Pig Iron Advanced $1 a Ton For Third Quarter Delivery

CHICAGO, July 11.—A few cross currents have crept into the market which may indicate that a moderate summer lull is approaching. Both new sales and specifications for finished steel are lighter, but shipments against old commitments continue to climb and ingot output has reached 60 per cent of capacity, a gain of about four points.

The scrap market is pushing to higher levels, though purchases are still confined to small lots taken at rather frequent intervals. Wire producers are experiencing a wavering demand from most consumers with the exception of automobile manufacturers. However, sellers anticipate that fall business will be in substantial volume.

Noteworthy in the price situation are advances of $1 a ton on pig iron and a change in the method of quoting on silicon differentials.

On the whole, buyers appear to be taking a more cautious attitude, and producers are closely watching the production curve.

Pig Iron

Third quarter prices have been established at $17, an advance of $1 a ton. There has also been a readjustment in the method of quoting silicon differentials. The base is taken at 1.75 to 2.25, above which the charge is 25c. for each 25 points of silicon. New sales are still in good volume and shipments are climbing. Only one furnace is in blast in this district and it is not keeping pace with demand. As a consequence stocks, though still of good size, are thin in spots. It is reported here that the Jackson and Globe stocks are practically sold out. One charcoal furnace is now in blast.

Cast Iron Pipe

This market is virtually at a standstill pending releases of loans at Washington. Current lettings are usually of less-than-carload proportions. Utilities faced by overcapacity and pressure for rate reductions are out of the market.

Reinforcing Bars

Prices are strong, but an advance evidently will not take place until the lead is taken by the mills. However, dealers are advancing extras, such as for drawings and trucking. A good number of small jobs are being placed and Chicago contractors are figuring on at least 30 widely scattered Federal projects. Illinois is now buying cement and Indiana has taken bids on 100 tons of highway steel. A round tonnage of bars may be needed for a contemplated lake front airport at Chicago. A Milwaukee contractor is low on the sewage plant for that city, but it is understood that funds are not yet available.

Warehouse Business

Shipments in June exceeded those of May, making the month the best in the first half of the current year. All gains are being held in July. Prices for common and cement coated nails are being advanced $3 a ton.

Rails and Track Supplies

The rail market remains dull, but the conviction is growing that fall orders are quite sure to materialize. A few small releases against old contracts permit one mill to limp along on a very light schedule. A fair volume of track accessories is moving to the railroads.

Plates

Colorado Springs, Colo., has placed 1000 tons of steel pipe and Milwaukee brewers have ordered 3000 tons of tanks. Other brewery business is scattered, but the aggregate tonnage is sizable. Railroad shops continue to call more men to work, and heavier repairs to rolling stock are being undertaken. This situation is reflected in rather a substantial way in specifications to mills. The increase in car loadings and the desire for prompt shipments is already resulting in the early indications of a car shortage for certain types of loading. The railroads are attempting to meet this situation by increased activity in repair shops.

Wire Products

The steady upward movement of demand for wire and wire products has at least momentarily come to an end. Demand is beginning to waver in practically all directions except from the automobile trade which now promises further gains, which may put July about 10 per cent ahead of June. The change in the character of demand does not yet indicate that a drop is near, but rather that the curve of shipments has flattened. Producers would not be surprised if they would now run into a mid-summer lull but they look for a substantial fall business. All prices announced for third quarter are strong. The industry is producing at 60 to 65 per cent of capacity.

Structural Material

The State of Illinois has thrown out all bids on the 1500-ton Justice Park viaduct and the job will be readvertised. This project has been kicked from pillar to post for almost a year and several times low bidders have been announced. The structural market has turned very quiet and the only real hope for revival lies in the Federal program.

Bars

Shipments are steady to most industries, but automobile and accessory plants are taking larger tonnages. Both sales and specifications are below the recent average and mills are now cutting into backlogs. Specifications from agricultural machinery manufacturers are larger, but the bulk of this material is going into repair parts. Road machinery plants are busier as they prepare to meet the demands of road builders who are now obtaining contracts through Federal aid. Prices for mild-steel bars are steady at 1.70c. a lb. for orders taken in July and for shipment up to Aug. 15.

Sheets

The new third quarter prices are firm but buying is lagging behind the average of recent weeks. However, backlogs are substantial and the shipping rate is between 55 and 60 per cent of hot mill capacity. Producers have sized up the situation as one which calls for slow action in increasing output. Deliveries range from two to four weeks, depending on the product.

Coke

Shipments of by-product foundry coke are the heaviest in two years, and the rate so far in July having been steadily increasing. Prices are firm at $7.50 a ton, local ovens.

Scrap

The highest price paid by a consumer of heavy melting steel is $10 a ton, but the tonnage involved was not large and dealers are pressing for higher prices, some of them having the idea that this grade will move above the $11 mark. On this score they are willing to pay more than $10 for tonnages they are accumulating against their next orders from users. Cast wheels have been reaching Chicago by boat from Duluth and the local market is dull. On the other hand, some cast grades and especially malleable scrap are moving briskly and at new high prices. Lists are being offered by the New York Central, the Nickel Plate and the Rock Island.

Mills Have Good Backlogs in Eastern Pennsylvania

New Buying Restricted Mainly to Sheets — Scrap Higher — Another Advance in Pig Iron Looked For

PHILADELPHIA, July 11.—Specifications against second quarter contracts have left steel mills with backlogs that insure rollings at the present rate for two or three weeks. As was to be expected new bookings at the higher levels are not large, though they represent a fair volume of miscellaneous tonnage. Sheet business in particular is holding up well. Orders for brewery tanks with flanged heads, which have stimulated mill operations in eastern Pennsylvania, also continue to be received.

Railroads appear to be holding up specifications somewhat, but are placing orders for repair work somewhat more extensively than was the case prior to the increase in car loadings. One line which had placed 6000 tons of plates for delivery in a month has asked that shipments be spread over three months. Other carriers also have ordered a slight delay in shipments. Nevertheless it is still believed in the trade that if traffic continues to increase, the railroads will come into the market by September for large tonnages for both repair work and new equipment. No large rail buying movement is looked for before next year, but track accessory requirements are expected to be placed soon.

The general view is that unless railroad or other buying intervenes in the meantime, there will be a lag in steel orders within the next month. After that the Naval shipbuilding program is expected to build up orders. Bids on 21 vessels will be opened on July 26. It is estimated it will require about two months after the public works program is under way before steel requirements reach the mills. The prospective lag, however, will be taken up to a fair extent by continued automotive purchases, according to present indications. Scrap prices have advanced further.

Open-hearth operations are being maintained at 40 per cent of capacity.

Pig Iron

New business in pig iron is light and consists chiefly of carlots. The letup had been anticipated in view of the recent relatively heavy specifications, which have left melters pretty well covered. Blast furnace operators report that July shipments so far are in excess of the June rate, which trebled the May rate. Prices are firm and it is reported that an increase of $2 a ton may be announced soon. Imports of pig iron into Philadelphia in June totaled 6370 tons, of which 2689 tons was Indian and 3681 tons was Royal Dutch iron.

Plates, Shapes and Bars

Makers have extended second quarter quotations through July. Railroads are buying material for repair work, though on some of the heavier tonnages they have asked that shipments be spread over longer periods than were at first specified. Reports continue that the carriers will come into the market for large requirements for car and locomotive repair work within two months provided traffic continues to increase. It is also expected that orders for new cars will be placed in good volume. The Pennsylvania Railroad will install concrete instead of wood piles for its pier at Baltimore, and the general contractor for this work, the Raymond Concrete Pile Co., New York, has placed 2400 tons of reinforcing bars with the Kalman Steel Corpn. The American Steel Engineering Co., Philadelphia, also has placed 1700 tons of reinforcing bars with the Youngstown Sheet & Tube Co., for concrete work on the pier.

Sheets

New business at the higher levels is coming to the mills in fair volume. Most of it is for automotive requirements. Present indications are that buying from this source will be well sustained throughout July. Miscellaneous sheet orders have let down somewhat following the heavy specifications at second quarter levels. Mills have a comfortable backlog which will maintain the present rate of rollings for two to three weeks and in some cases for a longer period.

Warehouse Business

Price advances are expected to be made by jobbers in a week or so. July business is being maintained at about the same rate that prevailed in June.

Scrap

The market has gathered additional strength. A number of important grades have been advanced, with No. 1 heavy melting steel taking a range of $10 to $10.50. Dealers contend higher prices can be obtained in view of the growing mill demand, but they are showing increased reluctance to sell, and in turn are having difficulty in getting supplies.

Output Still Rising in the South

BIRMINGHAM, July 11.—Nine blast furnaces are now operating in the Birmingham District, an increase of five since the latter part of June. On Monday of this week Woodward Iron Co. blew in its second furnace, No. 2, on basic. Its No. 3 furnace is on foundry. Last week the Tennessee Coal, Iron & Railroad Co. blew in Ensley No. 3 on basic, its fourth active furnace. There is prospect of another increase in the district before the end of the month. Republic Steel Corpn. is relining its No. 2 stack with the expectation of placing it in operation. Woodward Iron is also relining its No. 1 furnace.

Five of the nine furnaces are on basic iron and four on foundry. The Tennessee company has four on basic, Sloss-Sheffield two on foundry, Woodward Iron Co. one on foundry and one on basic, Republic Steel one on foundry.

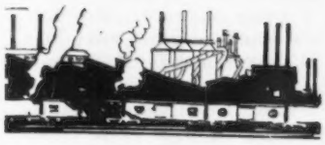
July shipments are maintaining the high rate of June, and indications are that there will be an increase over last month.

Prices are unchanged at $12. Furnaces are waiting for the acceptance of the iron and steel code at Washington before announcing an advance. It is hinted that the increase will amount to $2 a ton, instead of $1 as previously mentioned.

Steel

Steel bookings are undiminished and July production will probably remain at the high point of last week. Open-hearth operations most of last week were above 79 per cent, and no change is scheduled for the present week. The first three days of last week 13 open-hearths were operated, then followed an increase to 19 on Wednesday, when five units at the Ensley Works were started and one at Fairfield, out for repairs, resumed. There are 24 open-hearth furnaces in the district. The Ensley rail mill started work Monday of this week and will run for several weeks.

Post-Quarter Lull in Business at New York



New Buying Lags Following Heavy Specifying — Export Order Calls for 36,000 Tons of Rails and 2000 Tons of Accessories

NEW YORK, July 11.—The steel market is characterized by a decided "post-quarter" lull which, of course, had been expected. On many products specifications now on the books will insure steady mill operations throughout July. New prices announced on sheets, strip, wire nails and pipe have not yet been tested.

Pressure for tin plate continues unabated. In some cases buyers who had not covered their full requirements in contracts are having difficulty in getting additional material. Some mills are booked solid for four months ahead. While a price advance would not have a great deal of significance in view of the condition of the mills, it is thought likely that an upward revision in line with increased tin prices will be announced about Aug. 1.

High points in the construction field are the placing of 15,000 tons of structural steel for a New York Central viaduct in this city to Post & McCord, New York, who have sublet the fabrication to the American Bridge Co. and the Fort Pitt Bridge Co.; and the award of 3200 tons of reinforcing bars for bridgeways at Jones Beach, Long Island, New York, to the National Bridge Works. Releases of Government construction projects which have been held up since the bank moratorium are so far confined to small jobs, particularly post offices. Larger work will not be let until a permanent public works administrator is appointed.

Railroad buying is featured by the purchase of nine oil-electric switching locomotives by the Delaware, Lackawanna & Western, two Diesel electric switchers by the United States Navy, one steam locomotive each by the Durham & Southern Railroad and the United Fruit Co., and one multi-section aluminum alloy articulated five-car train by the Brooklyn-Manhattan Transit Corpn. Railroads are gradually purchasing more car repair material, but there is a growing feeling that if freight traffic continues to climb they may suddenly be confronted with a shortage of cars. The United States Steel Corpn. has booked an order from Brazil for 36,000 tons of rails and 2000 tons of track accessories.

The Pan-American Petroleum & Transport Co., Texas City, Tex., has inquired for 3000 tons of steel pipe.

Pig Iron

Open inquiry has diminished. The present lull, however, is considered to be a natural outgrowth of the heavy buying in May and June. Current dealings are consequently limited generally to spot purchases. With most buyers covered through July, there is little disposition to discuss forward needs until the expected announcement of price schedules on Aug. 1. Prospective price policies will depend upon trade codification. There is a general belief here that, if no definite line-up of prices is set by Aug. 1, quotations will probably be made on a month-to-month basis. Bookings for the week totaled only 2000 tons, contrasted with 3700 tons the week before and 4000 tons a fortnight ago. The normal pace of deliveries against contracts indicates sustained activity among district melters. Buffalo and eastern Pennsylvania furnaces are holding rigidly to base quotations. Foreign iron is slightly more active, despite unstable exchange rates.

Reinforcing Bars

Fresh specifications for bars expanded measurably in the past week. Public works projects still account for a major share of current tonnage, with some support from small-lot needs for private work. The outstanding award for the week covered 3300 tons for bridgeways at Jones Beach, N. Y. About 3100 tons was placed for Pennsylvania Railroad piers at Baltimore, and 750 tons for the New York Central Railroad viaduct in New York. Other contracts included 230 tons for a warehouse in Brooklyn, and 250 tons for highway construction in Westchester County, N. Y. A sewage disposal plant at Rahway, N. J., will require about 500 tons. Although prices on normal quantities are held firmly at 1.60c. a lb. for mill lengths and 1.75c. a lb. for cut lengths, Pittsburgh, concessions on major tonnages have not entirely disappeared.

Scrap

Continued buying of heavy melting steel by the leading Eastern consumer has firmly established No. 1 and No. 2 steel at recently advanced levels. Market support from that factor has engendered a wide consuming interest that has spread to many other grades. Several grades, including stove plate and No. 1 heavy breakable cast, have moved up $1 to $1.25 a ton higher on active buying. More moderate advances have occurred in No. 1 blast furnace and cast borings, which are also in good demand. Current movement in this district is virtually restricted to barge loading. Quotations for rail shipment are consequently nominal at advanced levels. Brokers are still not inclined to release heavy tonnages for extended delivery in the belief that prices will continue to seek higher ground. Export loadings have improved, although fresh commitments for such movement are scarce.

Scrap Advances in Cincinnati Market

CINCINNATI, July 11.—Pig iron sales activity was restricted, the past week, to scattered single car orders, totaling about 500 tons. Northern representatives have not opened their books for August business, because of uncertainty as to future quotations. The attention of both sellers and consumers is being focused on the formulation of trade policies under the Industrial Recovery Act, and this is having a depressive affect upon trading. No inquiry has developed and present business is largely the result of direct solicitation. Shipments of pig iron are steadily increasing. The placing of a moderate-sized order locally for special machine tool castings, the past week, added further to the improvement of foundry operations.

Coke

Advances on by-product foundry coke have not affected the market, new business remaining unspectacular. Movement of fuel to foundries on contract continues to be very good.

Steel

Advent of an appreciable demand from brewery interests for steel containers contributed to the further rise in steel bookings the past week. Sheet specifications, the past week, passed 70 per cent of mill capacity and rolling schedules this week will be near 74 per cent. Automotive demand has slackened, while other consumers appear to be approaching the present peak of their requirements.

Scrap

Dealers, eager to cover in anticipation of improved demand, are bidding the market steadily upward without consumer support. The result is that yard supplies are "frozen," and in many instances yard interests are setting prices $2 above the present market on their supply. Advances on virtually all items have been made, with further increases predicted.

Additional Blast Furnaces to Start in Cleveland Area

Ingot Output Sustained by Heavy Backlogs — Nickel Plate to Release 2300 Tons of Rails

CLEVELAND, July 11. — With heavy specifications for all forms of finished steel placed on the books for July shipment or at the convenience of the mills, new demand has declined rather sharply since the first of the month. However, the size of the order books assures the maintenance of mill operations around present levels through July. Deliveries of some products, particularly sheets and strip steel, have in some cases been slightly deferred and some buyers in the automotive field are pressing the mills for shipments. Some new business in small lots has come out and the new prices are being maintained on products that have been advanced. While not much new business is looked for during the next week or two, renewed demand in good volume is expected before the end of the month.

There has been some improvement in business from the railroads. The Nickel Plate is expected to release shortly 2300 tons of rails carried over from last year.

Ingot output is unchanged this week in the Cleveland-Lorain territory at 74 per cent of capacity, the three plants that are active operating all their open-hearth furnaces. Two blast furnaces in this territory are scheduled to start up before the end of the month, the fourth furnace of the Corrigan McKinney Steel Co. in Cleveland and one of the Toledo furnaces.

A uniformity in price policy on steel bars, plates and shapes has developed and clarified the situation with respect to these products. The 1.60c., Pittsburgh, price for plates and shapes and 1.65c., Cleveland, price for bars will be quoted for the entire quarter, but preferred customers who heretofore have been granted concessions will be allowed to specify at their old prices through July. Thus elimination of all concessions to large contract buyers will not occur until Aug. 1. A local mill which announced a 1.65c. price on bars for July only is expected to extend this price through the quarter. The only other product on which there is still price uncertainty is cold-rolled strip, all producers not yet having announced the $5 a ton advance.

Pig Iron

Sales have declined but inquiry has improved. Some foundries that will have their present stocks about used up by Aug. 1 are anxious to know what iron will cost them next month in order that they may figure on contracts for castings. A leading producer in this territory today advanced prices on malleable and foundry iron $1 a ton, this price to extend through the third quarter. While local furnaces have not yet announced a price change, they are expected to fall in line with the advance, which raises quotations to $16.50, Cleveland, for foundry and malleable iron for local delivery and outside shipment.

Bars, Plates and Shapes

New business has been light since the first of the month, following the heavy rush of orders during the closing days of June. The outlook in the building field is more promising because of numerous projected Federal buildings and various municipal projects that are expected to receive Government aid. Among the latter are extensions to the Easterly sewage disposal plant in Cleveland, which will take several thousand tons of steel.

Warehouse Business

Warehouses have advanced galvanized sheets $7 a ton to 3.85c. Other grades are unchanged. Jobbers, in conformity with the advance in the mill price, have marked up nails $5 a ton to $2.35 per keg, Cleveland.

Strip Steel

Sales have declined, but mills have heavy specifications taken before the higher prices became effective and are being crowded for delivery, particularly by some of the motor car plants which have not reduced their production schedules. In some cases producers are unable to maintain their delivery schedules. A good seasonal demand has developed from manufacturers of metal toys. Hot-rolled strip seems well stabilized at 1.60c. to 1.65c., Pittsburgh, most producers holding to the latter price. The price situation in respect to cold-rolled strip has not been clarified. While most mills are quoting 2.25c., Cleveland, for the third quarter, others have not named a price for that delivery and no business has come out to test the market.

Sheets

New business was rather light the past week because of the heavy specifications against old contracts before the July 1 price advance. However, quite a few small-lot sales have been made at the new prices. Some mills will take orders at present prices through the third quarter and others only up to Aug. 1, with Aug. 15 set as the deadline on deliveries. Mills have about all the tonnage they can roll for two weeks and some are filled up for a longer period. Demand from the electric refrigerator industry has slowed down somewhat. Jobbers have specified heavily for galvanized sheets to replace their exhausted stocks and these sheets are moving well to the country districts.

Scrap

Consumers are taking heavy shipments against recent orders, and while there was no new buying by mills during the week the market is very firm. Dealers are not finding it as easy as recently to purchase scrap at prevailing prices. Flashings, machine shop turnings and No. 1 busheling have advanced 50c. a ton. The Pennsylvania Railroad has issued a list containing 9300 tons and the Nickel Plate Railroad a miscellaneous list including 1300 tons of heavy melting steel. Dealers are paying $10 for No. 1 heavy melting steel and $7.50 for borings and turnings for Cleveland delivery.

Tank Award Features St. Louis Market

ST. LOUIS, July 11.—Few sales of pig iron were made during the last week, most of the melters in the district having committed themselves for the present. The market continues firm, with prices unchanged.

The demand for most steel items has been tapering off since July 1. The Shell Petroleum Corpn. has awarded a contract for tanks requiring 1600 tons of plates for their Woodriver, Ill., plant to the Chicago Bridge & Iron Co.

The scrap market has been inactive, since most dealers were in Chicago last week attending the meeting of the Institute of Scrap Iron Dealers. Prices are firm but unchanged. Railroad lists: Southern Railway, 200 tons; St. Louis-Southwestern Railway, 35 carloads.

E. & G. Brooke Iron Co., Birdsboro, Pa., has begun improvements and repairs on its blast furnace, idle for close to two years, and plans to place the unit in service early in fall, giving employment to about 100 men.

Fabricated Structural Steel

Awards in Good Volume—New Projects Decline

LETTINGS of 27,225 tons the past week are the third largest for any corresponding period this year. The outstanding award was 15,000 tons for a viaduct in New York City for the New York Central Railroad. The greatest activity has been in the east. New projects of 5900 tons compare with 15,950 in the previous week and 7225 tons two weeks ago. The largest inquiry is 1750 tons for the Rockefeller Institute in New York. Plate awards total 7660 tons. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

Greenville, Me., 200 tons, school, to McClintic-Marshall Corpn.

New York, 15,000 tons, New York Central railroad viaduct, to Post McCord, New York. Steel will be fabricated by American Bridge Co. and Fort Pitt Bridge Works Co.; James Stewart & Co., Inc., is general contractor.

New York, 790 tons, Frick museum, to George A. Just Co.

New York, 2130 tons, brewing building for Jacob Ruppert Co., to New York Steel Corpn.

Brooklyn, 750 tons, Interboro Beverage Corpn. building, to Berkshire Structural Steel Co.

Union City, N. J., 160 tons, post office, to Bethlehem Fabricators, Inc.

Albion, N. Y., 225 tons, State buildings, to Leach Steel Corpn.

Niagara Falls, N. Y., 175 tons, Oldbury Chemical Co. building, to McClintic-Marshall Corpn.

Corning, N. Y., 375 tons, New York Central railroad crossing elimination, to Jones & Laughlin Steel Corpn.

Philadelphia, 515 tons, Publicker Commercial Alcohol Co., to Morris Wheeler & Co.

Philadelphia, 270 tons, Scholler Brothers, Inc., warehouse, to American Febricated Steel Co., Philadelphia.

Philadelphia, 265 tons, warehouse for William F. Lotz, to American Fabricated Steel Co.

Marcus Hook, Pa., 675 tons, Congoleum-Nairn, Inc., to Belmont Iron Works.

Bridgeton, N. J., 180 tons, Owens-Illinois Glass Co., to Fort Pitt Bridge Works Co.

CENTRAL STATES

Royal Oak, Mich., 285 tons, radio shrine, to R. C. Mahon Co.

Toronto, Ill., 140 tons, State highway bridge, to Continental Bridge Co.

State of Indiana, 200 tons, highway bridges, to Central States Bridge & Structural Co., Indianapolis.

Du Page County, Ill., 240 tons, beam spans, to Midland Structural Steel Co.

Chicago, 160 tons, trestle for Excelsior Motor Mfg. & Supply Co., to American Bridge Co.

Hutchinson, Kan., 250 tons, store for S. S. Kresge, to Kansas City Structural Steel Co.

WESTERN STATES

State of Colorado, 325 tons, bridges, to unnamed bidders.

Las Vegas, Nev., 500 tons, intake towers for Boulder Dam, to American Car & Foundry Co.

South San Francisco, 160 tons, American Brake Shoe & Foundry Co. plant, to Judson-Pacific Co.

San Francisco, 100 tons, Golden Gate bridge pier work, to Herrick Iron Works.

San Francisco, 510 tons, Key System pier sheds, to McClintic-Marshall Corpn.

State of California, 145 tons, Stanislaus River bridge, to Pacific Coast Steel Corpn.

Los Angeles, 2500 tons, Walter loft building, to Consolidated Steel Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Boston, 400 tons, hospital kitchen.

New London, Conn., 170 tons, Bulkley High School; Topper & Griggs Co. contractor.

New York, 1750 tons, addition to Rockefeller Institute.

Buffalo, 175 tons, repairs to Louisiana Street bridge.

THE SOUTHWEST

Supply, Okla., 710 tons, State highway bridge.

CENTRAL STATES

Justice Park, Ill., 1500 tons, State viaduct.

Austin, Minn., 200 tons, building for George A. Hormel & Co.

WESTERN STATES

Culbertson, Mont., 950 tons, Missouri River bridge.

FABRICATED PLATE

AWARDS

Philadelphia, 110 tons, Publicker Commercial Alcohol Co. tanks, to Chicago Bridge & Iron Works.

Philadelphia, 300 tons, oil tanks in eastern Pennsylvania for Atlantic Refining Co., to Chicago Bridge & Iron Works.

Pittsburgh, 820 tons, eight barges for Campbell Transportation Co., to Jones & Laughlin Steel Corpn.

Huntington, W. Va., 540 tons, six sand barges for Union Sand & Gravel Co., to McClintic-Marshall Corpn.

Wood River, Ill., 1600 tons, tanks for Shell Petroleum Corpn., to Chicago Bridge & Iron Works.

Milwaukee, 3000 tons, brewery tanks, to various bidders.

Denver, 290 tons, guide anchor rods for Boulder dam, to John W. Beam Co.

Colorado Springs, Colo., 1000 tons, steel pipe, to National Tube Co.

NEW PROJECTS

San Francisco, 490 tons, Alameda Creek siphon; Western Pipe & Steel Co. low bidder, on steel alternate.

Railroad Equipment

Delaware, Lackawanna & Western Railroad has purchased nine Diesel oil-electric switching locomotives. American Locomotive Co. will assemble six of 600-hp. each, and Ingersoll-Rand Co. has been allotted the other three, each of which will be powered by two 325-hp. Ingersoll-Rand engines. General Electric Co. will supply electrical equipment for entire order.

Durham & Southern Railroad has placed order for one 2-10-0 type locomotive with Baldwin Locomotive Works.

United Fruit Co. has ordered two 2-8-2 type locomotives from Baldwin Locomotive Works.

United States Navy Department has ordered two 35-ton Diesel-electric switching locomotives from Atlas Car & Mfg. Co.

Brooklyn-Manhattan Transit Corpn. has ordered one multi-section, aluminum alloy, articulated five-car train from Pullman Car & Mfg. Corpn.

Cudahy Packing Co. has ordered 200 sets of steel underframes from Pullman Car & Mfg. Corpn.

Fair Sales of Pig Iron at Boston

BOSTON, July 11.—Pig iron sales increased slightly the past week, aggregating 1900 tons. This is a gratifying showing in view of the fact that most furnaces will not sell beyond July delivery and the largest New England melters have enough iron to carry them well into the third quarter and in some cases into the fourth. Alabama and Indian irons are not much of a market factor these days. Alabama furnaces are not inclined to sell for less than $10.50 a ton, furnace, for No. 2X, and the foreign exchange market reacts against Indian iron sales here.

Scrap prices are very firm, but not actually higher. Brokers have more orders to work on, but of late have not been particularly successful in securing tonnages of importance, since holders of scrap are waiting for higher prices. For the first time in months certain materials such as machine shop turnings and cast iron borings are beginning to accumulate at manufacturing plants because of increased operations, but such stocks have by no means become burdensome.

Reinforcing Steel

Awards 8300 Tons—New Projects, 950 Tons

New York, 1000 tons, West Side viaduct for New York Central Railroad, to Kalman Steel Co.

New York, 3300 tons, bridgeways at Jones Beach, to National Bridge Works, Long Island City; Arundel Corpn., general contractor.

New York, 750 tons, New York Central viaduct, to Kalman Steel Corpn.; James Stewart & Co., Inc., New York, general contractor.

Brooklyn, 230 tons, Interboro Beverage Corpn. warehouse, to Fireproof Products Co., New York.

Yonkers, N. Y., 250 tons, Westchester County Park commission highway, to Concrete Steel Co.; A. W. Banko Corpn., Westchester, general contractor.

Baltimore, 2400 tons, Pennsylvania Railroad Pier; from Raymond Concrete Pile Co., to Kalman Steel Co.

State of Colorado, 378 tons, highway structures in 10 counties, to unnamed bidders.

NEW REINFORCING BAR PROJECTS

Elmira, N. Y., 340 tons, grade crossing elimination for Erie Railroad.

Rahway, N. J., 500 tons, sewage disposal plant.

State of Indiana, 100 tons, road work; bids opened July 11.

Effort to Unionize Metal Trades Centers in Detroit

DETROIT, July 11.—American Federation of Labor has granted a charter to the United Automobile Workers Union of America which will be the federated union for automobile workers. Local branches will be established in individual plants making motor cars and automotive parts according to present plans.

Each local will be chartered directly by the American Federation of Labor. The Detroit Metal Trades Council, a branch of the Detroit Federation of Labor, has been revived and is planning an active campaign for unionization of the metal trades in Detroit. Apparently Detroit is to be the focal point for the campaign of the labor unions to unionize the metal trades. William Collins in charge of the campaign for the American Federation of Labor states that "automobile workers can only secure the maximum benefits to which they are entitled under the Industrial Recovery Act through collective action. No real lasting benefit can be secured from affiliation with company unions. Workers can only succeed through affiliation with bona fide trade unions through which they may select their own representatives to represent them in the final negotiations of an industrial code."

Meanwhile efforts of the automobile industry to conform to the wishes of the Roosevelt Administration in regard to shorter working hours continue. Chevrolet Motor Co. has put into effect a thirty-seven and a half hour week in all its plants consisting of three seven and a half hour shifts daily five days a week. The minimum pay of men working in local automobile plants is forty cents an hour and of women thirty cents. The committee of the National Automobile Chamber of Commerce which is working on a code for the industry is meeting in Detroit today.

Unfilled Steel Orders Gain 176,956 Tons

UNFILLED orders of the United States Steel Corpn. increased 176,956 tons in June, scoring the largest gain for any month since January, 1931, and the third consecutive monthly upturn. The June gain was attributable chiefly to exceptionally heavy last-minute specifications against second quarter contracts. Unfilled orders as of June 30 were 2,106,671 tons, compared with 1,929,815 tons at the close of May. Unfilled orders at the end of each month since 1930 follow:

	1933 Tons	1932 Tons	1931 Tons
January	1,898,644	2,648,150	4,132,351
February	1,854,200	2,545,629	3,965,194
March	1,841,002	2,472,413	3,995,330
April	1,864,574	2,326,926	3,897,729
May	1,929,815	2,177,162	3,620,452
June	2,106,671	2,034,768	3,479,323
July	.....	1,966,302	3,407,816
August	.....	1,969,595	3,169,457
September	.....	1,985,090	3,144,833
October	.....	1,997,040	3,119,432
November	.....	1,968,301	2,933,891
December	.....	1,968,140	2,735,353

General American Tank Corpn. Changes Name

The stockholders of the General American Tank Car Corporation at their annual meeting on April 11, voted to change the name of the company to the General American Transportation Corporation. It was felt that the latter is more descriptive of the company's diversified activities.

Iron and Steel Code To Be Submitted

WASHINGTON, July 11.—General Hugh S. Johnson, Administrator of the National Recovery Act, said today he expects the iron and steel code of fair competition to be submitted tomorrow. It is not certain that it can be presented that soon, however, he added. It will be offered by the American Iron and Steel Institute, according to Deputy Administrator Simpson, and will represent between 90 and 95 per cent of the country's steel capacity. It was also stated that it will not carry prices.

General Johnson said it is not possible to state whether the code will be satisfactory to the Administration until hearings are concluded. He explained that seven days notice would be given before hearings would begin. Speaking of the lumber code submitted today, General Johnson said he would not even consider the maximum of 48 hours for a work week. This was taken to indicate no industry will be allowed to establish work weeks of that length. He also said that the minimum wage of 22½c. an hour set up in the lumber code is far below what he considers a living wage.

General Johnson said that he is considering the idea of setting a limit for filing of codes and fixing days for hearings on them. This statement was made in response to rumors that the Administration was about to adopt drastic measures to force submission of codes. He said there is much conjecture about plans of President Roosevelt to take this step, but did imply that if necessary a vigorous policy may be adopted. It is the plan, though, he said, to ask voluntary action on the part of industries generally to establish hours of labor and wages for immediate adoption, codes to be submitted later and propose any necessary adjustments. It was stated that industries cannot be ordered to establish hours and wages without first being given a hearing but that if cooperation to this end can be brought about voluntarily it is hoped to arrive at that result in this way.

Cast Iron Pipe

Sturbridge, Mass., has awarded 20,000 ft. of 6 and 8-in. to Warren Foundry & Pipe Corpn.

Old Lyme, Conn., is expected to inquire soon for a tonnage of small sizes.

New York City is inquiring for 256 tons of 6 to 12-in.

Hudson River State Hospital, Poughkeepsie, N. Y., requires about 500 tons; bids July 26.

Bucyrus, Ohio, is considering trunk line water supply system about four miles. Fund of $78,000 is being arranged.

Milwaukee has awarded 500 tons of 12-in. class C to United States Pipe & Foundry Co. at $40.70 a ton.

Lynchburg Foundry Co., Lynchburg, Va., is low bidder on 875 tons of 8-in. for Chicago.

Corpus Christi, Tex., plans installation of pipe line, about 24-in. and smaller, 60 miles, for trunk line for water supply system. Cost over $700,000 with pumping and other equipment.

Torrance, Cal., plans installation of more than 181,000 ft. about 35 miles, of 4 to 16-in. for new municipal water system. Fund of $400,000 is being arranged. Salisbury, Bradshaw & Taylor, 714 West 10th Street, Los Angeles, are consulting engineers.

San Francisco awarded 1595 tons of 6 and 8-in. class 150 to Central Foundry Co.

Alhambra, Cal., will take bids July 18 on 171 tons of 18-in.

Renton, Wash., plans 10-in. pipe line from city station to Talbot reservoir, replacing present trunk line.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 25 for 2000 ft. lap-welded iron pipe (Schedule 378) for Puget Sound Navy Yard.

Pipe Lines

Richmond, Ky., has authorized plans for steel pipe line extensions in municipal gas distribution system, with other improvements. Cost about $40,000. Black & Veatch, 405 East 13th Street, Kansas City, Mo., are consulting engineers.

South West Pipe Lines, Inc., Ben Avon, Pittsburgh, plans 6-in. steel pipe line across Ohio River at Ben Avon, for crude oil.

Richard Schwab, Livingston, Tex., operating local oil well property, has secured right-of-way for steel pipe line to Goodrich, Tex., about eight miles.

Pan-American Petroleum & Transport Co., Texas City, Tex., is inquiring for 3000 tons of miscellaneous sizes of steel pipe.

At a public sale, July 6, no bids were tendered for purchase of the West Rockaway, N. J., property of Rockaway Rolling Mills, Rockaway, N. J., consisting of about 30 acres of land, mill units and other buildings. It is proposed to arrange for another sale in near future. The Rockaway company has consolidated operations at its plant on Beach Street, Rockaway.

Copper, Lead and Zinc Prices Score Further Advances

Zinc Stiffens as Ore Prices Soar—Spot Straits Tin Eases on Sterling Decline—Copper, Lead Quiet

NEW YORK, July 11.—United efforts of domestic copper interests to establish electrolytic values more nearly in line with producing costs resulted in a further advance last week of ½c. to a basis of 9c. a lb., Connecticut. There is little expectation of further advances until domestic consumers show a more definite mood to buy copper. Offerings at 9.25c., Connecticut, have been entirely neglected, and only minor lots have been booked at 9c. since the advance last Friday. Lake copper matched the rise in electrolytic and is slightly more active at 9c., delivered New York.

Foreign demand has been lively in contrast with the domestic situation. With the dollar tumbling to a record low level, European buyers covered rather freely toward the latter part of last week. Continental values, as a result, rose from 8.60c. to 9.35c. a lb., c.i.f. European ports, settling back today at around 9.15c.

Tin

The disorderly gyrations in dollar values, as reflected by the movement in sterling exchange, has had an exceedingly depressive effect on domestic and foreign tin transactions. Starting the last seven-day period at 46.50c., spot Straits rose with sterling to the year's high of 48c. a lb., New York, late last Friday. Active exchange participation by the British Government forced tin values to a lower level, and spot Straits settled weakly at 46c. late today. The present differential for English refined is nominally set at ¾c. a lb. Trading was made extremely difficult by rapid fluctuations of quotations, and sales during the week dropped to a low level as brokers could make no firm offerings. Local traders expect steadier values next week, with consequent improvement in inquiry. In London, quotations dropped sharply today to £211 10s. a ton for spot standard, £211 5s. for future standard and £216 10s. for spot Straits. A somewhat smaller decline was evidenced by the Singapore market, which today was quotable at £216 15s. a ton. Straits shipments up to and including July 8 totaled 1572 tons.

Lead

Quotations rose $4 a ton to a current level of 4.50c. a lb., New York, and 4.35c., St. Louis, during the week. Demand from major consumers continues in good volume, although new inquiry is spotty. There is little expectation of further early advances in prices, with inquiry at a comparatively low level and Sterling exchange at a value considered to be close to a peak. Inquiry is mostly for August delivery, and smelters have not extended bookings beyond that period.

Zinc

Despite the low volume of current inquiry the local market scored an advance of $5 a ton during the past week. Small tonnages are available today at 5.22c. a lb., New York, or 4.85c., St. Louis. The advanced price is based entirely upon the tightness of the ore situation. In many cases, producers refuse to quote to new brand customers at the present price and are not opening their books for shipment beyond Sept. 1. Many smelters are unable to secure ore at $35 and therefore consider present quotations as unsatisfactory for prime Western metal. Production of ore is expected to expand during the week about 2200 tons over the 2500 tons estimated for last week. Smelters secured only 1500 tons of Joplin ore last week, and miners are further restricting shipments unless bids go over the current $35 offerings. Ore shipments the past week totaled 2500 tons, and visible stock remained at 13,400 tons.

The Week's Prices. Cents Per Pound for Early Delivery

	July 6	July 7	July 8	July 10	July 11
Electrolytic copper, N. Y.*	8.25	8.50	8.75	8.75	8.75
Lake copper, New York	8.50	8.75	9.00	9.00	9.00
Straits tin, Spot, N. Y.	46.50	48.00	....	47.00	46.00
Zinc, East St. Louis	4.60	4.75	4.75	4.85	4.85
Zinc, New York	4.97	5.12	5.12	5.22	5.22
Lead, St. Louis	4.15	4.25	4.35	4.35	4.35
Lead, New York	4.30	4.40	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.75c. a lb., New York.
Brass ingots, 85-5-5-5, 9c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	48.50c. to 49.50c.
Tin, bar	50.50c. to 51.50c.
Copper, Lake	10.50c. to 11.25c.
Copper, electrolytic	10.25c. to 10.75c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	15.62½c.
*High brass sheets	14.25c.
*Seamless brass tubes	15.87½c.
*Seamless copper tubes	16.12½c.
*Brass rods	11.75c.
Zinc, slabs	5.75c. to 6.25c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	5.25c. to 6.25c.
Lead, bar	6.50c. to 7.50c.
Lead, sheets	8.25c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent.	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal commerical grade	27.00c. to 52.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	49.50c.
Tin, bar	51.50c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, casting	10.00c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	53.50c.
Solder, ½ and ½	27.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	7.00c.	7.75c.
Copper, hvy. and wire	6.75c.	7.50c.
Copper, light and bottoms	5.75c.	6.375c.
Brass, heavy	3.75c.	4.50c.
Brass, light	3.25c.	3.75c.
Hvy. machine composition	5.25c.	5.75c.
No. 1 yel. brass turnings	4.375c.	4.75c.
No. 1 red brass or compos. turnings	5.00c.	5.375c.
Lead, heavy	3.50c.	3.875c.
Zinc	2.50c.	3.00c.
Cast aluminum	6.50c.	7.50c.
Sheet aluminum	11.75c.	13.50c.

Sharp Gain in Machine Tool Orders

Another sharp gain was made in machine tool orders during June, according to the monthly report of the National Machine Tool Builders Association, Cleveland. New orders last month increased to an index rating of 38.3 per cent as compared with 27.6 per cent in May. Shipments were 28.3 per cent as against 22.9 per cent in May and unfilled orders were 37.6 per cent as against 32.5 per cent in May.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributers)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.598c. to 1.698c.
C.i.f. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum). (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill, 1½ in.	3.00c.
1-3/16 to 1¼ in.	2.50c.
1-9/16 to 1⅞ in.	2.35c.
1-15/16 to 2⅞ in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.65c.
No. 10, f.o.b. Chicago mill	1.75c.
No. 10, del'd Philadelphia	1.86c.
No. 10, f.o.b. Birmingham	1.80c.
No. 10, c.i.f. Pacific Coast ports	2.27½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Chicago mills	2.35c.
No. 24, del'd Philadelphia	2.56c.
No. 24, f.o.b Birmingham	2.40c.
No. 24, c.i.f. Pacific Coast ports	2.90c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.95c.
No. 10 gage, f.o.b. Chicago mills	2.05c.
No. 10 gage, del'd Phila.	2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.40c.
No. 20 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.56c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20 f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.i.f. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8 lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¾ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.60c. to 1.65c.
All widths up to 24 in., Chicago	1.70c. to 1.75c.
Cooperage stock, P'gh	1.60c. to 1.65c.
Cooperage stock, Chicago	1.70c. to 1.75c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.25c.
F.o.b. Cleveland	2.00c. to 2.25c.
Del'd Chicago	2.55c.
F.o.b. Worcester	2.45c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
Extras of 10c. a 100 lb. on mixed and joint carloads, 20c on pool carloads and 30c, or less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

	Per Lb.
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$2.10
Smooth coated nails	2.10
Galvanized nails	3.60
	Base per 100 Lb.
Smooth annealed wire	$2.50
Smooth galvanized wire	2.85
Polished staples	2.80
Galvanized staples	3.05
Barbed wire, galvanized	2.60
Woven wire fence No. 9 gage, base column, per net ton	$55.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago and Anderson prices are $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Steel Black	Steel Galv.	Wrought Iron Inches	Wrought Iron Black	Wrought Iron Galv.
⅛	51½	29½	⅛	+91¾	+138
¼ to ⅜	57	38½	¼ & ⅜	+1½	+21½
½	62	50½	½	31½	15
¾	65½	55½	¾	36½	20½
1 to 3	67½	58½	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	63½	54½	2	37	22½
2½ to 3	66½	57½	2½ to 3½	38	25
3½ to 6	68½	59½	4 to 8	40	28½
7 and 8	57½	57	9 to 12	38	24½
9 and 10	67	57			
11 and 12	66	56			

Butt Weld, extra strong, plain ends

⅛	78½	33½	⅛	+13	+45½
¼ to ⅜	54½	41½	¼ & ⅜	+2½	+34½
½	69	51	½	32½	17½
¾	64½	55½	¾	37½	22½
1 to 3	66½	58½	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	61½	53½	2	40	26
2½ to 3	65½	57½	2½ to 4	45½	33
3½ to 6	69	61	4½ to 6	45	32½
7 to 8	68	58	7 & 8	46	33
9 and 10	67	57	9 to 12	41½	30
11 and 12	66	56			

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—4¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	41
1¼ to 1½ in.	53	3½ to 3½ in.	44
1¾ in.	37	4 in.	46
2 to 2¼ in.	27	4½, 5 and 6 in.	36
2½ to 2¾ in.	34		

Hot Rolled

2 and 2¼ in.	33	3¼ to 3½ in.	50
2½ and 2¾ in.	40	4 in.	52
3 in.	47	4½, 5 and 6 in.	42

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel), f.o.b. mill	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.40
Spikes, ½-in. and smaller	2.40
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh, 72½, 25 and 10	
Stove bolts in packages, Ch'go, 72½, 25 and 10	
Stove bolts in packages, Cleveland, 72½, 25 and 10	
Stove bolts in bulk, P'gh	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60

Discounts of 75 per cent off on bolts and nuts applied on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.50
F.o.b. Chicago	2.60

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chi'o and Birm'g'm	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ¾ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in. inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in. inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in. inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in. inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

(*Turn to next page*)

Pig Iron, Ores, Ferroalloys

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$2.25 to $2.50
Foundry, f.o.b. Connellsville Prompt	3.00 to 4.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	8.26
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.10 to $1.20
Mine run coking coal f.o.b. W. Pa.	1.40 to 1.50
Gas coal, ¾-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.45 to 0.55
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.00c.
No. 4 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$40.00	$35.00
Maryland	40.00	35.00
New Jersey	50.00	38.00
Ohio	40.00	35.00
Kentucky	40.00	35.00
Missouri	40.00	35.00
Illinois	40.00	35.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$42.50 to $45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$43.40 to $44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	38.30
4-in., del'd New York	41.30
6-in., and larger, Birmingham,	$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00

Class "A" and gas pipe, $3 extra.

VALLEY

Per Gross ton f.o.b. Valley furnace:

Basic	$15.00
Bessemer	16.00
Gray forge	15.50
No. 2 foundry	15.50
No. 3 foundry	15.00
Malleable	15.50
Low phos., copper free	24.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$17.00
N'th'n No. 1 fdy.	17.50
Malleable, not over 2.25 sil.	17.00
High phosphorus	17.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, Copper free.	25.00
Silvery, sil. 8 per cent	24.92
Bess. ferrosil'n, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$16.00
Del'd St. Louis	16.35
Malleable, f.o.b. Granite City	16.50
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	16.35

Freight rates, 83c (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

'er Gross ton, delivered New York district:

*Buffalo, No. 2, del'd Eastern N. J.	$17.41
Buffalo malleable, del'v'd Eastern N. J.	17.91
East Pa. No. 2 fdy.	17.02
East Pa. No. 2X fdy.	17.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	14.00
Lake Superior charcoal, del'd	23.41

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$16.51
Ala. fdy., sil. 2.25 to 2.75	16.76
Tenn. fdy., sil. 1.75 to 2.25	16.51
N'th'n No. 2 foundry	$17.01 to 18.19
S'th'n Ohio silvery, 8%	21.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy.	$15.50 to $16.50
Malleable	15.50 to 16.50
Ohio silvery, 8 per cent	23.00
Stand. low. phos., Valley	23.00
Southern No. 2 fdy.	16.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.00 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$16.34
East. Pa. No. 2X	16.84
East. Pa. No. 1X	17.34
Basic (del'd east Pa.)	16.09
Malleable	16.84
Stand. low phos. (f.o.b. east. Pa. furnace)	$22.00 to $23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are delv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.50
Basic	12.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:

Buffalo, sil. 1.75 to 2.25	$18.53 to $19.04
Buffalo, sil. 2.25 to 2.75	18.53 to 19.04
Ala., sil. 1.75 to 2.25	18.00 to 18.50

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carloads)	$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$27.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton		Per Gross Ton	
6%	$19.00	12%	$22.00
7%	19.50	13%	22.50
8%	20.00	14%	23.00
9%	20.50	15%	23.50
10%	21.00	16%	24.00
11%	21.50		

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace

Per Gross Ton		Per Gross Ton	
10%	$21.50	14%	$23.50
11%	22.00	15%	24.00
12%	22.50	16%	24.50
13%	23.00		

Manganese 1½ to 3%. $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.65% or over, $1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to 2.80
Ferrocarbontitanium, 15 to 18% per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorous, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	1.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	7.50c.
Iron, low phos., Swedish, average 68½% iron	8c.
Iron, basic or foundry, Swedish, average, 65% iron	7.50c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	7.50c.
Manganese, Caucasian, washed 52%	18c.
Manganese, African, Indian, 50-52%	18c.
Manganese, Brazilian, 46 to 48%	16c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00

	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.00
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	16.00
Chrome, 48%, Cr_2O_3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$10.50 to $11.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	13.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00 to $12.25
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.00 to 12.50
Compressed sheet steel	11.75 to 12.25
Hand bundled sheet steel	10.50 to 11.00
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	8.50 to 9.00
Short shov. steel turnings	8.50 to 9.00
Short mixed borings and turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	9.50 to 10.00
No. 1 cast	10.00 to 11.00
Railr. knuckles and couplers	13.00 to 14.00
Rail, coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	13.00 to 13.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$10.00 to $10.50
Shoveling steel	10.00 to 10.50
Hydraulic comp. sheets	$8.50 to $9.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Rolled carwheels	11.00 to 11.50
Railroad tires	11.50 to 12.50
Railroad leaf springs	11.00 to 11.50
Axle turnings	7.75 to 8.25
Steel couplers and knuckles	10.50 to 11.00
Coil springs	11.50 to 12.00
Axle turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	10.50 to 11.00
Low phos. plates, 12 in. and under	10.50 to 11.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	6.00 to 6.50
Rerolling rails	11.00 to 11.50
Steel rails, less than 3 ft.	10.75 to 11.25
Steel rails, less than 2 ft.	11.50 to 12.00
Angle bars, steel	10.50 to 11.00
Cast iron carwheels	9.50 to 10.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	8.50 to 9.00

	Per Net Ton
Iron car axles	$12.50 to $13.00
Steel car axles	11.25 to 11.75
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00

No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	9.00 to	9.50
Pipe and flues	4.75 to	5.25
No. 1 machinery cast	10.50 to	11.00
Clean automobile cast	8.75 to	9.25
No. 1 railroad cast	10.00 to	10.50
No. 1 agricultural cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Grate bars	6.75 to	7.25
Brake shoes	9.00 to	9.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$10.00 to	$10.50
No. 2 heavy melting steel	9.00 to	9.50
No. 1 railroad wrought	....	11.00
Bundled sheets	$4.00 to	4.50
Hydraulic compressed, new	....	6.00
Hydraulic compressed, old	....	5.00
Machine shop turnings	7.00 to	7.50
Heavy axle turnings	7.50 to	8.00
Cast borings	....	7.00
Heavy breakable cast	10.00 to	10.50
Stove plate (steel works)	....	8.00
No. 1 low phos. heavy	13.00 to	13.50
Couplers and knuckles	11.00 to	11.50
Rolled steel wheels	11.00 to	11.50
No. 1 blast furnace	....	7.00
Spec. iron and steel pipe	8.00 to	8.50
Shafting	13.00 to	13.50
Steel Axles	13.00 to	13.50
No. 1 forge fire	8.00 to	8.50
Cast Iron carwheels	12.00 to	12.50
No. 1 cast	12.00 to	12.50
Cast borings (chem.)	10.00 to	10.50
Steel rails for rolling	11.00 to	11.50

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting steel	9.25 to	9.50
Compressed sheet steel	9.00 to	9.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	8.50 to	9.00
Machine shop turnings	7.00 to	7.25
Short shoveling turnings	7.00 to	7.50
No. 1 busheling	8.00 to	8.50
Steel axle turnings	7.50 to	8.00
Low phos. billet crops	12.00 to	12.50
Cast iron borings	7.25 to	7.50
Mixed borings and short turnings	7.25 to	7.50
No. 2 busheling	7.00 to	7.25
No. 1 cast	10.00 to	10.50
Railroad grate bars	5.50 to	6.00
Stove plate	5.50 to	6.00
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	10.00 to	10.50
Railroad malleable	10.00 to	10.50
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	....	$10.00
No. 2 heavy melting scrap	$8.75 to	9.25
Scrap rails	8.75 to	9.25
New hydraul. comp. sheets	8.75 to	9.25
Old hydraul. comp. sheets	7.50 to	8.00
Drop forge flashings	8.25 to	8.75
No. 1 busheling	8.75 to	9.25
Hvy. steel axle turnings	7.50 to	8.00
Machine shop turnings	6.25 to	6.50
Knuckles and couplers	11.00 to	11.50
Coil and leaf springs	11.00 to	11.50
Rolled steel wheels	11.00 to	11.50
Low phos. billet crops	12.00 to	12.50
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.50 to	7.00
Cast iron borings	6.50 to	7.00
No. 2 busheling	6.00 to	6.50
Steel car axles	11.00 to	12.00
Iron axles	11.00 to	12.00
No. 1 machinery cast	10.50 to	11.00
No. 1 cupola cast	10.00 to	10.50
Stove plate	8.00 to	8.50
Steel rails, 3 ft. and under	12.00 to	12.50
Cast iron carwheels	9.00 to	9.50
Industrial malleable	11.50 to	12.00
Railroad malleable	11.50 to	12.00
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$9.50 to	$10.00
Scrap steel rails	9.00 to	9.50
Short shoveling turnings	4.50 to	5.00
Stove plate	6.50 to	7.00
Steel axles	11.00 to	11.50
Iron axles	....	11.00
No. 1 railroad wrought	7.00 to	7.50
Rails for rolling	....	10.50
No. 1 cast	....	10.00
Tramcar wheels	....	10.00
Cast iron borings, chem	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.00 to	$8.50
No. 1 heavy melting	8.00 to	8.50
No. 2 heavy melting	7.50 to	8.00
No. 1 locomotive tires	6.00 to	6.50
Misc. stand.-sec. rails	9.00 to	9.50
Railroad springs	9.50 to	10.00
Bundled sheets	4.50 to	5.00
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	3.00 to	3.50
Rails for rolling	9.50 to	10.00
Machine shop turnings	3.00 to	3.50
Heavy turnings	4.00 to	4.50
Steel car axles	9.50 to	10.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	8.00 to	8.50
No. 1 railroad wrought	6.00 to	6.50
Steel rails less than 3 ft.	10.00 to	10.50
Steel angle bars	9.00 to	9.50
Cast iron carwheels	8.00 to	8.50
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	8.00 to	8.50
No. 1 railroad cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Relay rails, 60 lb. and under	16.00 to	16.50
Relay, rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	6.00 to	6.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.75 to	$6.10
Scrap T rails	5.75 to	6.00
Machine shop turnings	2.75 to	3.00
Cast iron borings	2.00 to	2.25
Bundled skeleton long	4.00 to	4.25
Forge flashings	4.00 to	4.25
Blast furnace scrap	2.50 to	2.75
Shafting	8.50 to	9.00
Steel car axles	8.00 to	8.50
Wrought pipe	2.25 to	2.50
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	7.25 to	7.75

Per gross ton delivered consumers' yards:

Textile cast	$8.00 to	$8.50
No. 1 machinery cast	7.50 to	8.00
Stove plate	4.25 to	4.50
Railroad malleable	12.00 to	12.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$6.50 to	$7.50
No. 2 heavy melting steel	5.25 to	6.50
Heavy melting steel (yard)	2.50 to	3.00
No. 1 heavy breakable cast	6.00 to	6.50
Stove plate (steel works)	5.25 to	5.75
Machine shop turnings	3.75 to	4.00
Short shoveling turnings	3.75 to	4.00
Cast borings	3.50 to	4.00
No. 1 blast furnace	3.50 to	3.75
Steel car axles	9.50 to	10.00
Spec. iron and steel pipe	....	$3.50
Forge fire	....	4.25
No. 1 railroad wrought	$5.00 to	5.50
No. 1 yard wrought long	3.50 to	3.75
Rails for rolling	6.25 to	6.75
No. 1 cast	6.50 to	7.00
No. 2 cast	5.50 to	6.00
Stove plate (foundry)	5.50 to	6.00
Cast borings (chemical)	6.00 to	6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	5.00 to	5.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$8.25 to	$8.75
Scrap rails for melting	8.25 to	8.75
Loose sheet clippings	3.00 to	3.50
Bundled sheets	5.25 to	5.75
Cast iron borings	5.50 to	6.00
Machine shop turnings	5.00 to	5.50
No. 1 busheling	6.00 to	6.50
No. 2 busheling	3.00 to	3.50
Rails for rolling	8.75 to	9.25
No. 1 locomotive tiers	7.75 to	8.25
Short rails	10.75 to	11.25
Cast iron carwheels	7.75 to	8.25
No. 1 machinery cast	8.25 to	8.75
No. 1 railroad cast	7.75 to	8.25
Burnt cast	5.75 to	6.25
Stove plate	5.75 to	6.25
Agricultural malleable	7.25 to	8.25
Railroad malleable	8.25 to	8.75

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$8.25 to	$8.75
Borings and short turnings	6.25 to	6.75
Long turnings	5.25 to	5.75
No. 1 machinery cast	8.00 to	8.50
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	8.50 to	9.00
Stove plate	5.00 to	5.50
New No. 1 busheling	7.25 to	7.75
Old No. 2 busheling	5.00 to	5.50
Sheet clippings	5.50 to	6.00
Flashings	6.50 to	7.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$4.50	$4.50
Rails, scrap	4.50	4.50
Machine shop turnings	2.00	2.00
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	2.95c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.10c.
Galv. sheets (No. 24), 25 or more bundles	3.60c.
Hot-rolled sheets (No. 10) 2.60c. to	2.90c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.61
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per kg.	2.20

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.75c. to 1.90c.
Rail steel reinforcement	1.50c. to 1.65c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.59c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg. lots)	2.75c.
Rivets, boiler (keg lots)	2.75c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank	65
Hot-pressed nuts, hex., tap. or blank	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire per 100 lb.	$3.45
Com. wire nails, base per keg	2.45
Cement c't'd nails, base per keg	2.45

NEW YORK

	Base per lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, swed. charcoal	5.75c. to 6.25c.
Cold-fin. shafting and screw stock;	
Rounds and hexagons	3.54c.
Flats and squares	4.04c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	3.00c.
Hot-rolled ann'l'd sheets (No. 24*)	3.65c.
Galvanized sheets (No. 24*)	4.00c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.65
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
Black corrug. sheets (No. 24)	3.65c.
Galv. corrug. sheets	4.05c.
Structural rivets	3.00c.
Boiler rivets	3.00c.
	Per Cent Off List
Tan't rivets, 7/16 in. and smaller.	
100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.35c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No 24)	3.15c.
†Galvanized sheets (No. 24)	3.50c.
*Hot-rolled annealed sheets (No. 10)	2.70c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 2.35c.
Cold-fin. steel bars	2.95c.
Flat rolled steel under ¼ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.75c.
Bands	3.20c.
Cold-finished bars	3.32c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.05c.
Structural rivets	4.00c.
Small rivets	60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	3.75c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled sheets (No. 10) 48-in. and narrower	3.00c.
Wider than 48-in.	3.25c.
Com. wire nails, base per keg	$2.40
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	2.60c.
*H beams and shapes	2.60c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	2.60c.
*Floor plates, diamond pattern	4.50c.
*Bar and bar shapes (mild steel)	2.50c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.50c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, half ovals, ovals and bevels	3.75c.
Tire steel, rd. edge 1½ x ½ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	2.45c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

Base prices for 40,000 lb. orders; extras apply for smaller quantities.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	2.80c.	3.30c.	3.00c.
Shapes, standard	3.45c.	3.30c.	3.00c.
Wide-flanged beams and columns	3.95c.	3.30c.	3.50c.
Soft steel bars	3.15c.	3.30c.	3.00c.
*Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.95c.	4.20c.	4.25c.
Hot-rolled sheets (No. 10)	3.33c.	3.80c.	3.50c.
Galv. sheets (No. 24)	4.55c.	4.50c.	4.00c.
*Struc. rivets, ¼ in. and larger	5.75c.	6.00c.	5.25c.
*Cold finished steel			
Rounds	5.50c.	5.50c.	5.50c.
Squares and hexagons	6.75c.	6.75c.	6.75c.
Flats	7.25c.	7.25c.	7.25c.
Common wire nails —base per keg	$2.65	$2.55	$2.60

*Subject to deductions for quantity.

Chain Co. to Fabricate Allegheny Metal

Allegheny Steel Co. of Brackenridge, Pa., has just completed an exclusive arrangement with the American Chain Co. of Bridgeport, Conn., whereby the Page Steel and Wire Co. Division at Monessen, Pa., will fabricate and sell Allegheny metal and Allegheny alloys in wire form in a complete range of gages and sizes. In the Hazard Wire Rope Co. plant at Wilkes-Barre, Pennsylvania, various forms of wire rope and cable will be made from Allegheny alloys.

In addition, several other subsidiary companies of the American Chain Co. will also fabricate Allegheny metal and Allegheny alloys into the various types of products that they manufacture.

"Rawlplug" at World's Fair

Visitors to the industrial engineering section in the general exhibition building in the Century of Progress exposition at Chicago found an interesting exhibit by the Rawlplug Co., Inc., New York.

The display features the firm's complete line, including Rawlplug fiber screw anchors, three-point Rawldrills for masonry, Rawl anchors, and crowners and Lok-crowners for sealing and concealing bolt and screw heads and nuts.

Samples of the various sizes and types of each item are attractively mounted on large display panels, together with illustrations of their use.

An attractive color scheme of blue, orange, silver and black is employed.

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Most visitors at the Century of Progress have stopped at the Marine Fountain—the world's longest soda fountain—where beer is served as well as all cold and soft drinks.

This beautiful fountain has, as a back wall, for nearly its entire 120 foot length an aquarium where hundreds of fish disport themselves.

A new decorative note was struck in the metal trim of both the Marine Fountain and another but smaller soda and lunch bar located on the Fair grounds. Practically all of the trim is of "IngOclad" stainless clad steel, produced by the Ingersoll Steel & Disc Co., a division of the Borg-Warner Corpn., Chicago. The application of "IngOclad" includes counter edging, foot rests, kick plates, stool trim, stool standards, splash boards behind the fountain, back bars, back bar doors, sink tops and drain boards, shelving, cutlery bins and trays and serving table tops.

EMPIRE STEEL SHEETS

"WABIK METAL"
SPECIAL VITREOUS
ENAMELING STOCK

For all special Vitreous Enameling requirements.

Where Beauty must be more than skin deep.

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PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

Casey Brewing Co., Boston, now being organized by Edmund J. Casey, 201 Devonshire Street, and associates, with capital of $750,000, plans new multi-story plant, with power house, machine shop and other mechanical units. Cost over $350,000 with equipment.

Constructing Quartermaster, Fort Devens, Mass., will ask bids soon for new equipment storage and distributing plant. Cost about $50,000 with equipment.

E. M. Corbett, 49 Purchase Street, Fall River, Mass., architect, has let general contract to J. F. Mooney & Co., Academy Building, for extensions and improvements in local brewery, for company whose name is temporarily withheld. New equipment will be installed. Cost about $200,000 with machinery.

Fischer Brewing Co., 673 Park Street, Hartford, Conn., plans extensions and improvements, with installation of new equipment. Cost about $75,000 with machinery.

Harris Textile Machinery Corpn., Pawtucket, R. I., has been organized by Thomas Harris, 109 Hazard Avenue, Providence, and associates, to manufacture textile machinery and parts.

Norwalk Meeker Foundry Co., Norwalk, Conn., recently organized to take over Meeker Foundry Corpn., is resuming production of gray iron castings on a jobbing basis. E. S. Meeker is an officer of new company.

NORTH ATLANTIC

Titanium Pigment Co., 60 John Street, New York, an interest of National Lead Co., 111 Broadway, has made offer of $375,000 for property and assets of American Salpa Corpn., Spotswood, N. J., including plant on South River, and plans to remodel for new Eastern works. Entire project will cost over $600,000 with equipment. Salpa company has been in receivership several months.

Schock, Gusmer & Co., Inc., 857 Tenth Avenue, New York, manufacturer of brewing machinery, parts, etc., has organized company of similar name under New Jersey laws, capital $100,000, to operate former one- and four-story and basement plant of Federal Metal Bed Co., Hoboken, N. J., recently acquired. Work is under way on improvements and installation of machinery. Otto S. Schlich, 136 Liberty Street, New York, is architect.

Arrow Engineering Corpn., New York, has been organized by Joseph Klein, 209 East Thirty-ninth Street, and associates, to manufacture tools and mechanical equipment.

Public Works Administrator, Washington, will soon authorize plans for work in connection with army building program under National Recovery Act, and bids will be asked by constructing quartermaster at Mitchel Field, New York, for new coal storage and handling plant to cost $54,842 with equipment; completion of field shops, hangars and other structures; new pumping plant and water supply system, $50,000; extensions and improvements in underground electric system, $50,000. Bids will be asked by constructing quartermaster, Fort Monmouth, N. J., for new laboratory to cost $290,000 with equipment; equipment storage and distributing building, $45,000; incinerator, electrical system, etc.

Jasper-Groz Needle Co., Inc., New York, has been organized by Edward W. S. Jasper, 22 Dewitt Road, Elizabeth, N. J., and Edward L. Jasper, 942 Boulevard, Westfield, N. J., to manufacture knitting machines, steel needles, etc.

General Electric Co., Schenectady, N. Y., has increased production schedule in motor, turbine and other electrical equipment departments, and is now employing about 12,000 persons at local plant, with gross of 50,000 operatives at branch plants throughout country.

Columbia Brewing Co., 61 Newark Street, Hoboken, N. J., Louis E. Goldfarb, president, has acquired former three-story plant of Greenville Brewery, Jersey City, N. J., on site 100 x 300 ft., and plans extensions and improvements, including equipment, for new branch plant.

Red Arrow Electric Corpn., Irvington, N. J., has been organized by Michael Helffrich, 115 Montgomery Avenue, and associates, capital $125,000, to manufacture electrical equipment and supplies.

Nuprocess Luboil Co., Newark, recently organized, has leased one-story building at rear of 27-49 Haynes Avenue, 5000 sq. ft. floor space, for new processing plant for production of lubricating oils.

Eastern Steel Casting Co., Avenue L, Newark, has adopted full week production schedule for first time in 18 months, giving employment to regular working force.

Midland Tube & Pipe Co., 25 Broadway, New York, manufacturer of seamless steel tubing, steel pipe, etc., with plant at Bordentown, N. J., has plans for improvements in former one-story plant of American Ball Engine Co., Bound Brook, N. J., recently acquired for new works, including two-story addition. Cost over $30,000 with equipment.

Roto Tractor Corpn., Basking Ridge, N. J., has been organized by Roy B. Coon, Basking Ridge, and associates, to manufacture tractors, parts and other mechanical equipment.

Commissioner of Institutions and Agencies, State Office Building, Trenton, N. J., asks bids until July 17 for power plant equipment and auxiliaries, underground steam distribution piping, manholes, etc., for new power plant at State Reformatory, Clinton, N. J.

American Commercial Alcohol Corpn., Delaware Avenue and Tasker Street, Philadelphia, let general contract to S. H. Levin, 1619 Sansom Street, for three-story addition, 80 x 92 ft. Cost over $45,000 with equipment.

American Ice Co., 121 North Broad Street, Philadelphia, has called special meeting of stockholders, Aug. 4, to approve change in company operations to include brewing, and plans converting several plants for such production, purchasing brewing, bottling, tanks and other equipment. Company is now operating group of 18 ice-manufacturing plants in State. C. C. Small is president.

Klein Stove Co., Trenton and Tioga Streets, Philadelphia, manufacturer of gas ranges and other heating equipment, has let contract to McClintic-Marshall Corpn., Broad Street Station Building, for two one-story units, 87 x 112 ft. and 88 x 117 ft., respectively, and two-story administration building, 39 x 50 ft., to branch plant at Topton, Pa. Cost over $75,000 with equipment.

Schuylkill Iron Works, Conshohocken, Pa., has adopted full time operating schedule for first time in two years, giving employment to 315 men.

Turner & Harrison Pen Mfg. Co., Inc., 1211 Spring Garden Street, Philadelphia, manufacturer of steel pens, etc., has let general contract to Barclay White & Co., 22 North Thirty-sixth Street, for one-story addition. Cost about $25,000 with equipment.

Kamco Automotive Mfg. Corpn., Binghamton, N. Y., has been organized by C. J. Smethers, 453 Grand Avenue, Johnson City, N. Y., and associates, to manufacture automobile equipment.

Ludlum Steel Co., Watervliet, N. Y., has contracted with Ingersoll Steel & Disc Co., 310 South Michigan Avenue, Chicago, for production of metal beer barrels, using stainless and common steel shells.

SOUTH ATLANTIC

Holtite Mfg. Co., Warner and Ostend Streets, Baltimore, manufacturer of rubber products, has let general contract to Talles Construction Co., 4024 Bonner Road, for one-story plant unit, 65 x 120 ft. Cost over $40,000 with equipment.

Constructing Quartermaster, Fort Monroe, N. C., will ask bids soon for one-story machine shop, cost about $20,000, and three new magazine units, cost $40,000.

Bauernschmidt Brewing Corpn., 418 South Augusta Avenue, Baltimore, John G. Bauernschmidt, head, recently organized, has engaged Sandless & Wieman, 107 West Saratoga Street, architects, to draw plans for remodeling and equipping property lately acquired at Willard and Hollins Streets for new plant. Cost over $75,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 20 for 10 shipper shaft pinions, manganese bronze welding rods, steel welding rods, welders' goggles, and other supplies (Schedule 2883).

Gulf Refining Co., Atlanta, Ga., has asked bids on general contract for new oil storage and distributing plant at New Smyrna, Fla. Cost about $30,000 with tanks and equipment.

Constructing Quartermaster, Fort Benning, Ga., will ask bids soon for new hangars, with shop repair and reconditioning facilities, cost $130,000 with equipment; one-story equipment storage and distributing plant, cost $60,000; incinerator plant with equipment, $30,000; power house for central heating, $20,000; extensions in electrical system, waterworks and other utilities, $415,450.

Clyde-Mallory Lines, Jacksonville, Fla., plan erection of new pre-cooling plant with electric-operated equipment. Cost over $150,000 with machinery. General offices are at Pier 36, North River, New York.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 18 for one motor-driven engine lathe (Schedule 358) for Mare Island Navy Yard; rolled steel floor plates (Schedule 351), six enclosed cabinet type distribution panels and spare parts (Schedule 288) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards; safety valves and spare parts (Schedule 292) for Boston, Brooklyn, Philadelphia and Puget Sound yards; 4750 seamless steel boiler tubes (Schedule 354) for Puget Sound yard; 92 frictionless trunnion roller bearings (Schedule 374) for Washington Navy Yard; wire clips (Schedule 353) for Brooklyn and Mare Island yards; steel rivets and washers (Schedule 342), locks and latches (Schedule 339); until July 25, wire cloth (Schedule 368), magnet wire (Schedule 366) and steel and brass bolts and nuts (Schedule 373), all for Eastern and Western yards.

CENTRAL DISTRICT

Crescent Brewing Co., Tarr, near Jeannette, Pa., Morris Kelly, president, has approved plans for extensions and improvements, including additional equipment. Cost about $75,000 with machinery.

Pittsburgh Tool, Knife & Mfg. Co., Pittsburgh, has been organized under direction of M. D. Wedner, Grant Building, to manufacture saws, knives and other edge tools.

First National Brewery, McKees Rocks, Pa., operated by Independent Brewing Co., South Twenty-second Street, Pittsburgh, has plans for extensions and improvements, including new equipment. Cost about $60,000 with machinery.

Town Council, Fayetteville, W. Va., plans installation of pumping machinery and auxiliary equipment for extensions and improvements in municipal water system. Cost about $45,000. J. E. Settle, Charleston, W. Va., is consulting engineer.

Pittsburgh Coal Co., Oliver Building, Pittsburgh, has plans for new mechanical coal-washing and coking plant at Achor, Pa. Cost over $40,000 with machinery.

Peerless Motor Car Corpn., Cleveland, has organized Peerless Co., a subsidiary, to take over about one-fourth of plant, or 100,000 sq. ft. floor space, for brewery. Improvements will be made for initial capacity of 150,000 bbl. a year. Cost about $530,000 with machinery. Company has arranged for sale of stock in amount noted to provide funds.

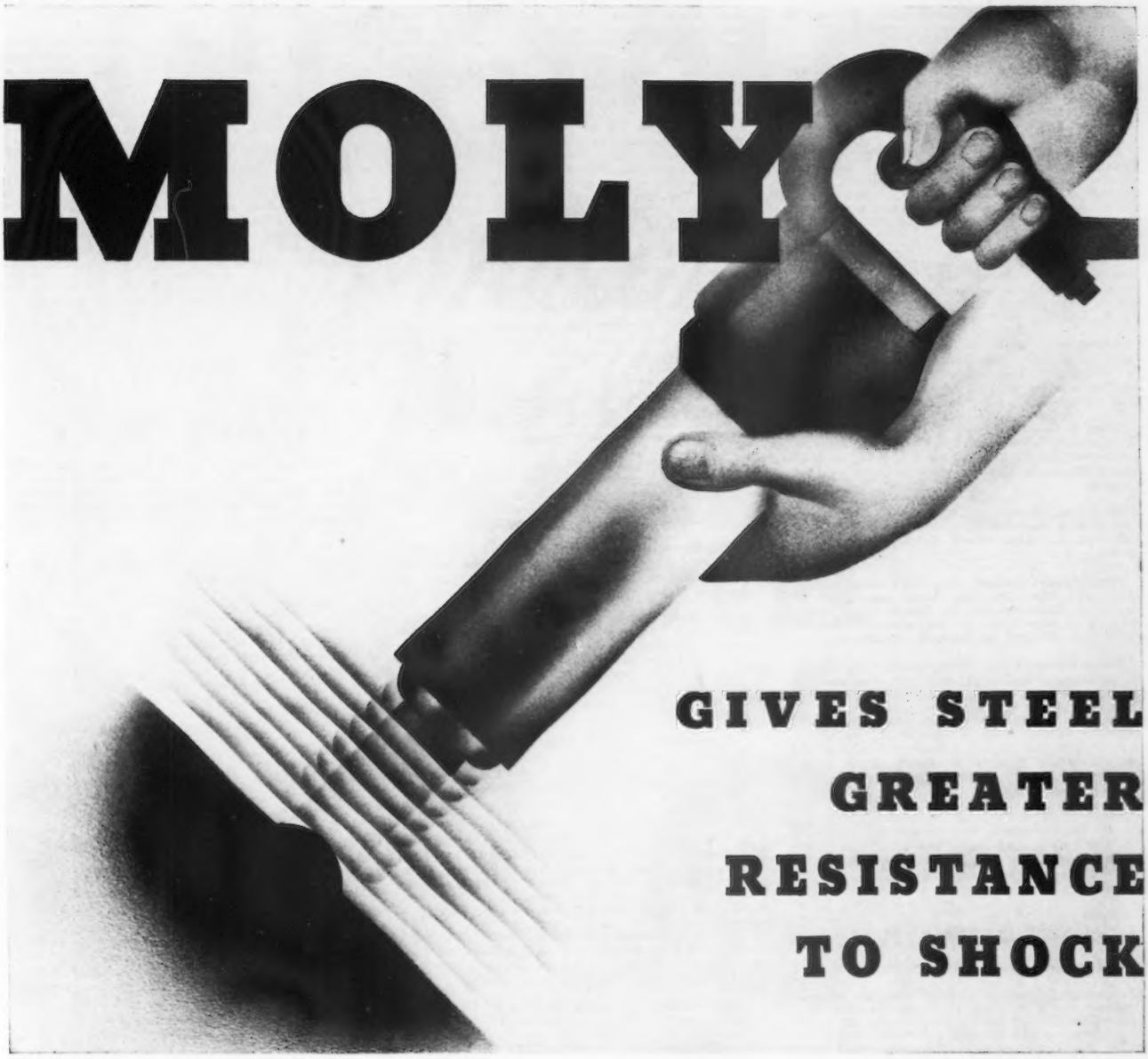
Harrington Piston Rings, Inc., Cleveland, care of H. H. Johnson, Union Trust Building, has been organized by Foster H. Pettey and Robert O. Evans, Cleveland, to manufacture piston rings and kindred products.

City Ice & Fuel Co., 6611 Euclid Avenue, Cleveland, Robert C. Suhr, president, is organizing a subsidiary to engage in brewing business. One or more of present ice plants will be remodeled for brewery. Initial expansion will cost over $100,000 with machinery.

Phoenix Caster Co., Hamilton, Ohio, has been organized to manufacture truck and furniture casters, and kindred hardware specialties. New company will take over organization of same name at 320 Millville Avenue.

Bruckmann Co., Ludlow Avenue, Cincinnati, let general contract to W. N. Steinmann, 20 Wilmuth Avenue, Wyoming, Ohio, for two additions to brewery, two-stories and basement, 45 x 68 ft., and one-story, 48 x 68 ft., re-

MOLY



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spectively, including improvements in present plant. Additional equipment will be installed. Cost over $80,000 with machinery. Stewart & Stewart, 622 Broadway, are architects.

City Council, Bedford, Ind., plans installation of pumping machinery and auxiliary equipment for extensions and improvements in municipal waterworks. Cost about $60,000. Charles Brossman, Chamber of Commerce Building, Indianapolis, is consulting engineer.

Sterling Brewers, Inc., Evansville, Ind., recently organized to take over plant and business of Evansville Brewing Association, is disposing of 100,000 shares of stock, part of proceeds to be used for expansion and equipment, to increase present capacity of 250,000 bbl. a year.

Voight Brewing Co., Cedar Street, Detroit, has plans for two additions, 80 x 132 ft., and 40 x 98 ft., including improvements in present plant. Cost over $100,000 with equipment. G. A. Mueller, 1346 Broadway, is architect.

Automatic Fuel Supply Co., 2831 Brooklyn Avenue, Detroit, has been organized by Joseph H. Parsons, 2730 Union Guardian Building, and associates, capital $50,000, to manufacture fuel pumps and parts.

Krug & Co., Inc., Port Huron, Mich., brewer, is planning installation of new equipment. Cost over $40,000. Giffels & Vallet, Inc., Marquette Building, Detroit, are architects and engineers.

Michigan Paper Co., Plainwell, Mich., is considering one-story addition for storage and distribution. Cost about $25,000 with equipment.

Cunningham Stoker Co., 2832 East Grand Boulevard, Detroit, has been organized by James G. Cunningham, 356 South Piper Boulevard, and associates, to manufacture stokers, parts and kindred mechanical equipment.

Arsenal Bronze Co., Thirty-second and Smallman Streets, Pittsburgh, has been organized to manufacture brass, bronze and aluminum castings of special and standard analysis. Company has taken over and improved plant formerly operated by Hill-Wallisch Bronze Co. A line of memorial and commercial tablets will also be made. Harry G. Shook is president; Walter G. Flood, vice-president, and William H. Bierman, treasurer.

Dayton Pneumatic Tool Co., recently acquired by W. R. Belleman, will be operated in conjunction with Peerless Tool Co. Additional space has been leased in Norwood Power Building for manufacture of a line of pneumatic tools.

SOUTHWEST

Wurzburger Brewing Co., Inc., 102 East Ninth Street, Kansas City, Mo., George S. Wurzburger, head, will take bids on general contract for new plant at North Kansas City, consisting of eight-story brew-house, 50 x 125 ft., two-story and basement bottling works, 50 x 125 ft., boiler house, machine shop and other units. Cost about $175,000 with equipment. Albert C. Wiser, 3714 Broadway, Kansas City, is architect.

Camden Milling Co., Camden, Ark., will carry out expansion and improvement program at cottonseed oil mill, including new presses and other equipment. Cost over $100,000 with machinery. W. F. Bradford is president.

Griesedieck Brothers Brewery Co., Nineteenth Street and Shenandoah Avenue, St. Louis, has let general contract to James Black Masonry & Contracting Co., 317 North Eleventh Street, for extensions and improvements. Cost over $45,000 with equipment. Baumes-McDevitt Co., Railway Exchange Building, is architect.

John F. Kroutel, president, Yukon Milling Co., Yukon, Okla., is at head of project to erect new brewery at Oklahoma City, Okla. Cost over $350,000 with equipment. Company will be organized to carry out development.

Hesse Envelope & Lithographing Co., 4173 North Kingshighway, St. Louis, is considering one-story addition to paper converting plant. Cost $50,000 with equipment.

Constructing Quartermaster, San Antonio Arsenal, San Antonio, Tex., will soon ask bids for group of equipment storage and distributing buildings, and magazine units. Cost $200,000 with equipment.

Milwaukee Brewing Co., 814 Ninth Avenue, Fort Worth, Tex., Frederick Schroeder, president, has filed plans for three-story addition, 50 x 100 ft., and improvements in present plant. New equipment will be installed. Cost about $100,000 with machinery.

Common Council, Goose Creek, Tex., is planning erection of new municipal electric light and power plant. Cost about $150,000 with equipment; also, installation of electric-operated pumping machinery for expansion and improvements in waterworks to cost about $100,000. David M. Duller, Second National Bank Building, Houston, Tex., is consulting engineer.

A. P. Green Firebrick Co., Mexico, Mo., has acquired property at Atlantic and Hanna Avenues, Toronto, for branch plant for manufacture of plastic firebrick, high temperature cements and other refractory materials. J. W. Amis, Toronto, is president and treasurer of Canadian subsidiary, and J. Harrison Brown, vice-president of Missouri company, is vice-president.

MIDDLE WEST

Roosevelt Brewing Co., Chicago, recently organized with capital of $500,000, has taken over former plant of Ruehl Brewing Co., 2646 Arthington Avenue. General contract has been let to Stresenreuter Brothers, 3020 South Halsted Street, for extensions and improvements. New equipment will be installed. Cost about $100,000 with machinery. Eugene Cary, Jr., is one of heads of new company.

Common Council, O'Fallon, Ill., is planning erection of a municipal electric light and power plant. Cost over $65,000 with equipment. W. A. Fuller Co., 2916 Shenandoah Avenue, St. Louis, is consulting engineer.

Elk River Concrete Products Co., Elk River, Minn., manufacturer of reinforced-concrete pipe culverts, plans new one-story works at Austin, Minn.

Cold Spring Brewing Co., Cold Spring, Minn., has asked bids on general contract for one-story addition, 53 x 123 ft., and will make improvements in present plant. New equipment will be installed. Cost about $125,000 with machinery. L. C. Pinault, Granite Exchange Building, St. Cloud, Minn., is architect.

Continental Nipple Mfg. Co., 2860 North Paulina Street, Chicago, has been organized by Julius C. Greenbaum and associates, capital $50,000, to manufacture pipe nipples, fittings, etc.

Hiawatha Brewing Co., Inc., Minneapolis, recently organized by Helmar Knudsen, 4001 Hiawatha Avenue, president, Lake Street Sash & Door Co., and Samuel Serigstad, 3440 Forty-sixth Avenue, capital $500,000, will convert part of sash and door plant noted for new brewery. Cost over $85,000 with machinery.

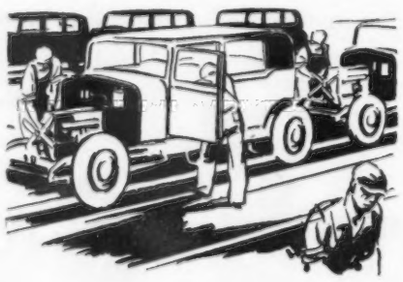
Charles Brown, 505 South Eastern Avenue, Joliet, Ill., has plans for new one-story machine shop, 20 x 35 ft., for manufacture of micrometers and other precision instruments.

Iowa-Nebraska Light & Power Co., Fourteenth and O Streets, Lincoln, Neb., plans installation of new electric distribution system in different parts of city. Cost about $50,000 with equipment.

SOUTH CENTRAL

Wiedeman Brewery Corpn. of Delaware, Newport, Ky., recently chartered by Dr. Walter B. Weaver, 111 East Fourth Street, Cincinnati, and associates, has acquired property at Newport, and will remodel for plant, including erection of two or more multi-story additions. Cost over $600,000 with machinery.

Memphis Refining Co., Memphis, Tenn., recently formed by G. C. Allen, Kilgore, Tex., and associates, has purchased plant of Urania Petroleum Co., Hollywood Avenue, and 10-acre tract. Plans have been authorized for extensions and modernization, with installation of equipment. Tanks and storage facilities will be increased. Cost over $85,000 with equipment.



United States Industrial Alcohol Co., Westwego, near New Orleans, plans rebuilding part of storage and distributing division at local denatured alcohol plant, recently destroyed by fire. Loss over $100,000 with equipment. Headquarters are at 60 East Forty-second Street, New York.

Constructing Quartermaster, Barksdale Field, La., plans call for bids soon for new machine shop, cost $80,000 with equipment; three new hangars, with repair and reconditioning facilities, including sprinkler system, etc., $355,800 with equipment; gasoline storage and distribution system, $20,000; one hangar unit with repair and reconditioning shop, $150,000; and magazine units, $15,000.

Tennessee Beverage Co., 11 West Butler Street, Memphis, Tenn., let general contract to W. T. Hudson, 63 South Third Street, for extensions and improvements in three-story plant. Additional equipment will be installed. Cost over $75,000 with machinery. Joseph T. Wallace, Bank of Commerce Building, is architect.

PACIFIC COAST

Standard Brands of California, Inc., 3233 Market Street, Oakland, Cal., manufacturer of yeast and other food products, has engaged Bliss & Fairweather, Balboa Building, San Francisco, architects, to draw plans for new plant in Elmhurst district, Oakland. Cost about $500,000 with machinery. Company is affiliated with Standard Brands, Inc., 595 Madison Avenue, New York.

Constructing Quartermaster, Hamilton Field, Cal., will soon ask bids for completion of four hangars, with repair and reconditioning facilities, gasoline storage and distributing plant, operations and headquarters buildings, cost $1,007,155 with equipment; ordnance and chemical storage and distributing building, $48,000; oil storage unit, $12,292; paint and oil storage building, $15,000; garage and repair shop, $30,000; field shops and warehouse, $15,231.

Airo Spray Equipment Co., San Jose, Cal., manufacturer of spraying equipment, parts, etc., plans rebuilding part of plant recently destroyed by fire. Loss about $35,000 with equipment.

A. L. Worswick, Las Vegas, Nev., architect, will draw plans for new local brewery for company now being organized. Cost about $125,000 with equipment.

Rose City Brewing Co., Portland, care of Carle Linde, Failing Building, architect, recently chartered by Otto Berg and T. J. Schmidt, Portland, with capital of $350,000, has taken over property at Dekum and Brant Avenues for new plant. Cost over $100,000 with machinery. W. Caven Taylor, Portland, is consulting engineer.

United States Engineer Office, Portland, will soon ask bids for construction of jetty at entrance to Fillamook Bay, Ore., including about 20,000 lb. drift bolts, 14,000 lb. machine bolts, 15,000 lb. spikes, 130 tons rails, and 20,000 ft. wire cable.

Samarkand Brewing Co., Ltd., 893 Folsom Street, San Francisco, Jacob P. Rittenmayer, head, recently organized, has engaged O'Brien Brothers and W. D. Peugh, 333 Montgomery Street, architects, to draw plans for new multi-unit plant at Oakland, Cal. Cost about $250,000 with equipment.

American Machine Works, West 1015 Broadway, Spokane, Wash., has taken out permit for one-story machine shop; general contract let to Charles F. Nygren, East 831 Thirty-second Street.

FOREIGN

Mawai Iron Mines, Ltd., Singapore, Federated Malay States, is considering erection of blast furnace at iron ore mining properties, Sungei Sebelf Besar River district, State of Johore. Plant will have capacity of about 300,000 tons a year. Cost over $1,000,000 with auxiliary structures and equipment.

State Department of Posts and Telegraphs, Melbourne, Australia, asks bids until Sept. 12 for automatic switching and automatic telegraph equipment for installation in rural districts.

Ministry of Communications, Government of Turkey, Istanbul, Turkey, has plans for new high-power radio broadcasting station at Ankara, Turkey. Cost about $500,000 with steel towers, power station, broadcasting plant equipment, etc.

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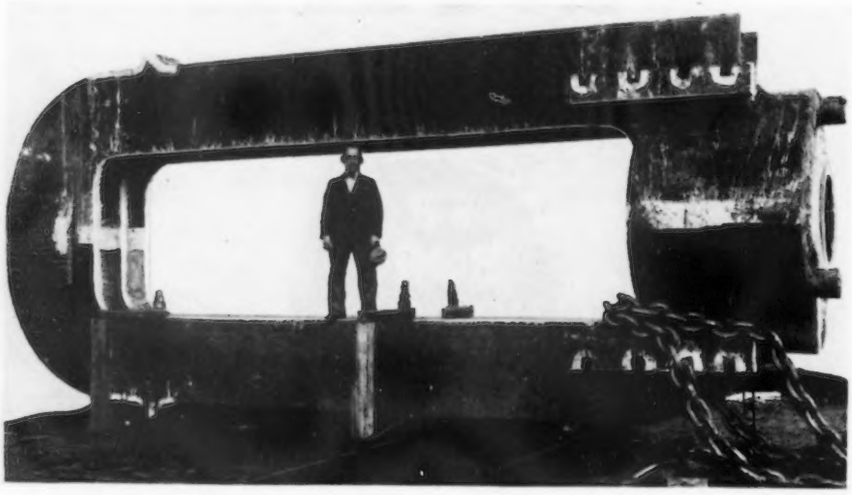
Innovations in Large Rolling Mill Housing Construction

INTERESTING deviations from the usual design of rolling mill housing were required in the construction of an 84-in. 4-high cold strip mill recently built by the United Engineering & Foundry Co., Pittsburgh, for the American Sheet & Tin Plate Co., Gary, Ind. As mentioned briefly in THE IRON AGE of May 25, page 833, a cast steel housing weighing 230,000 lb., which is probably the largest mill housing ever cast in one piece, was required. The mill was designed to roll cold strip accurately under pressures up to 12,000,000 lb. between the rolls and distribution of the working load, together with reduction in the stretch of the housings, was a prime consideration. Larger housings, having been built heretofore for blooming mills, have been constructed of separate vertical and horizontal members held together by various joint fastenings. Such construction was considered undesirable for this mill, as there is no practical method of joining the parts without concentration of the stresses.



In designing the single casting for this housing, the first problem was offered by the customary feet, which appear on the usual smaller housing. In a larger unit such feet would have meant a large projection of metal on each side, with probable "hot spots" in the casting while cooling in the mold. Such a condition is likely to cause a "draw" and a consequent unsound casting. The feet, therefore, were cast in a modified form, with a bed plate of entirely new design to carry and distribute the weight of the assembled mill.

The mill being of the precision type in which cold steel must be rolled with a specified allowance of a fraction of a thousandth of an inch, rigidity of the housing was a prerequisite. In determining the dimensions of the housing posts, the principal consideration was stretch under load. In this case, with a load of 12,000,000 lb. divided between the four housing posts, the following formula may be used to express the stretch of the posts, which is the most important factor in determining the stiffness of the housing:

$$\text{Stretch} = \frac{\text{Length} \times \text{load}}{\text{Area} \times E},$$

E is the modulus of elasticity of steel. As the maximum load on each post is a predetermined figure, 3,000,000, and E is a known constant, 30,000,000, stretch depends on the figures substituted for Length and Area. Obviously the smaller the figure for length and the larger the area, the less will be the resulting stretch.

These dimensions, of course, have limitations. The length of the housing post depends on the height of the window, which in the case of a cast housing can be kept at a minimum figure just large enough to contain chucks and allow free passage of rolls when roll changing. In determining the area of the housing post, consideration must be given to weight and its ultimate cost. Then with the dimensions settled there remains the shaping of the housing and this must be done in such a manner that the load will be uniformly distributed throughout.

Finally the housing posts are machined on all four sides. There is a three fold purpose behind this operation. First it is necessary for the individual posts to have an equal stretch and, by machining, the sectional area in each will be kept equal. This machining operation will also give a check on the homogeneity of the metal, another consideration in obtaining equal stretch in each post. Lastly, it is an advantage to the customer who in the future may desire to add some new guide attachment or entering device.

The finished dimensions of this housing were 25 ft. 8¼ in. high by 11 ft. 1 in. wide with a window 17 ft. 9 in. by 5 ft. 1 in. Each post has a section 30 x 33½ in. The top of the housing is designed for a 28 in. diameter screw and screw box.

New Trade Publications

Gas Burners.—Lee B. Mettler Co., 406 South Main Street, Los Angeles. Section No. 1 of catalog describing industrial applications of Mettler entrained combustion gas and oil burners.

V-Belts.—Gates Rubber Co., Denver. Bulletin devoted to applications of Gates vulco V-flat drive.

Concrete Floor.—Portland Cement Association, 33 West Grand Avenue, Chicago. Bulletin on how to build concrete floors, including specifications for bonded concrete floor finish.

Air Valves.—Yarnall-Waring Co., Chestnut Hill, Philadelphia, Bulletin describing Yarway-Becker automatic air control valves for portable pneumatic tools.

Die-Castings.—New Jersey Zinc Co., 160 Front Street, New York. Four-page bulletin dealing with the design of zinc base die castings, thickness of coating and effect of normal aging on properties of die cast zamak alloys.

Metallizing.—Metallizing Co. of America, Inc., 1218 Long Beach Avenue, Los Angeles. Twenty-page booklet covering metallizing process of metals coating, including applications and accessory equipment.

Cast Iron Culverts.—United States Pipe & Foundry Co., Burlington, N. J. June booklet covering use of cast iron culverts on highways, equipped with check valves; also cast iron pipe in an electric generating station and mechanical joints for cast iron pipe.

Wall Chart for Belt Users. With the continual increased business activity of the past few months, many plant engineers are facing the problem of reconditioning idle belts and placing them back into service. Such engineers will find useful information on a large 24 x 36 in. wall chart entitled "The Care of Leather Belt," which is being distributed free by E. F. Houghton & Co., 240 W. Somerset Street, Philadelphia.

Austin Service Stations is the title of a folder issued by the Austin Co., 16112 Euclid Avenue, Cleveland, describing a new type of steel building construction developed and marketed by the company particularly for automobile oil and gas service stations.

In construction, the building is largely prefabricated and the supporting frame, walls, sash, interior trim, and roof are entirely of steel. The exterior of the building is constructed of insulated steel panels which are porcelain-enameled. The interior walls are also of steel and look similar to a flush type office partition.

New Homes and Public Works Will Turn the Tide in Building

At the peak of the construction boom in 1928, building contract awards in 37 states totaled $6,600,000,000. In the first four months of 1933 the total was $202,000,000, an annual rate of $606,000,000.

A contraction so great as this indicates that the condition of over-building must be correcting itself. The country's population has not stopped increasing.

Actually, improvement in building is materializing. May contract awards showed a gain of 36 per cent over those for April.

Chief activity is found in residential building, for which the total in May was the largest since April, 1932, according to the F. W. Dodge Corporation.

Over and above this, the government is to undertake a huge public works program involving expenditures of over $3,000,000,000. Renewed construction activities will give momentum to those industries supplying building materials and equipment. Among the most important of these are the manufacturers of heating equipment and enamelware.

The plants of the Interlake Iron Corporation have for many years supplied pig iron and foundry coke to manufacturers of these products.

INTERLAKE IRON CORPORATION

PIG IRON - COKE

PLANTS—CHICAGO . DULUTH . TOLEDO . ERIE

PICKANDS, MATHER & COMPANY, Sales Agents

CLEVELAND . CHICAGO . DETROIT . ERIE . TOLEDO . MINNEAPOLIS . DULUTH

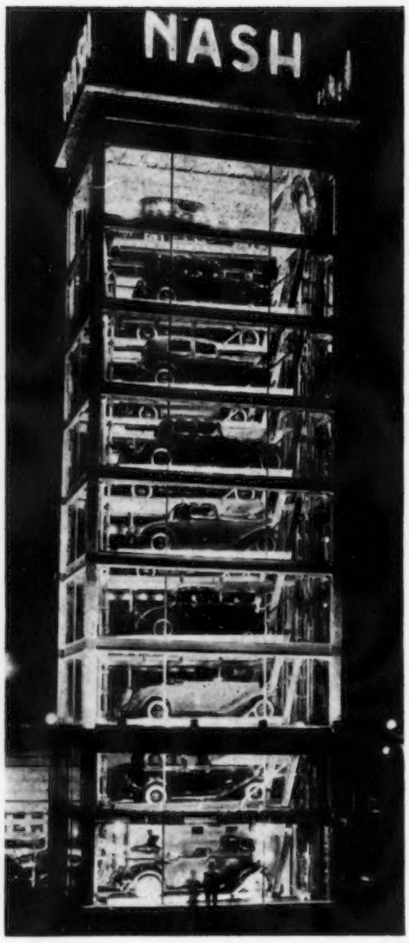
Auto Parking Tower At Century of Progress

WHITING CORPORATION, Harvey, Ill., and the Nash Motors Co., Kenosha, Wis., have joined in an exhibit at A Century of Progress by making use of the Whiting auto-parking tower upon the platforms of which are various models of the automobile as manufactured by Nash. The height of the structure is 75 ft. and as it now stands has a 16 car capacity, although the unit is designed for an added height which will provide 30 car capacity. The structure required 105 tons of structural steel and the tower is completely enclosed in glass so that visitors to A Century of Progress will not only visualize operation of the parking tower but will also observe a display of Nash motor cars.

The tower mechanism consists of steel parking platforms, one for each individual car, mounted on endless steel chains which are guided between columns, like safety tracks, and are driven in either direction by an electric motor operating through a speed reducer. The drive unit is mounted over the entrance. When parking, an automobile is driven on to the individual parking platform where it remains completely protected against all possible damage. The owner receives a claim check upon which is imprinted a number corresponding to the number of the parking platform on which the car is parked. When the owner claims his car the attendant merely presses an automatic selector button on which is the number corresponding to the number on the check. By means of the reversible motor, cars are brought from any level to the entrance level via the shortest and quickest route. An indicator and control show at a glance the location of any car in the tower as well as all vacant parking spaces.

The load is carried directly on steel link roller chains which are supported in such a way that if a chain fails the load cannot drop. The structure is of riveted construction, but the platforms are about 98 per cent welded.

This system of parking cars is particularly adapted for use in connection with garages, apartment buildings, office buildings, department stores, theaters, hotels or public parking stations for the reason that it conserves valuable ground space and reduces operating cost through automatic control and by the elimination of rehandling of cars.



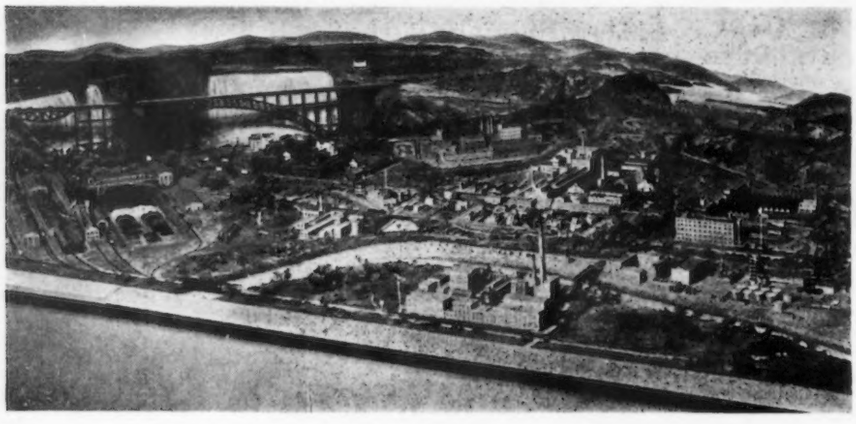
New Departure at Century of Progress

BOUNCING balls, rolling balls, revolving balls, and the clicking of assorted animated displays are causing thousands of people visiting the General Motors Building at the Century of Progress to gravitate toward an unusual exhibit of the New Departure Mfg. Co.

In addition to the familiar bouncing balls—which demonstrate uniform steel structure and sphericity—which leap through the bore of a revolving bearing, perfectly synchronized, the center of most attention is the spectacle of two large steel balls which roll without apparent means of propulsion around a miniature track.

In the center section under the shadow of a canopy appears New Departure's famous slogan, "Nothing Rolls Like a Ball," spelled out by steel balls against a velvet background. To the casual passerby, these balls appear to revolve although actually they stand still. The mystery of this phenomenon causes much of the crowding which has later necessitated the erection of a protective wall of boxwood hedge in a large semi-circle.

Flanking this center grouping are two large murals depicting the uses of New Departure products and below each are indirectly-lighted recesses displaying various types of New Departure Ball Bearings.



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Industry in Miniature

ANIMATED and skillfully lighted to show scenes of both night and day activity this large model depicting the industrial plants of the Union Carbide & Carbon Corpn. is an interesting part of the corporation's extensive exhibit in the Hall of Science at the Century of Progress Exposition at Chicago.

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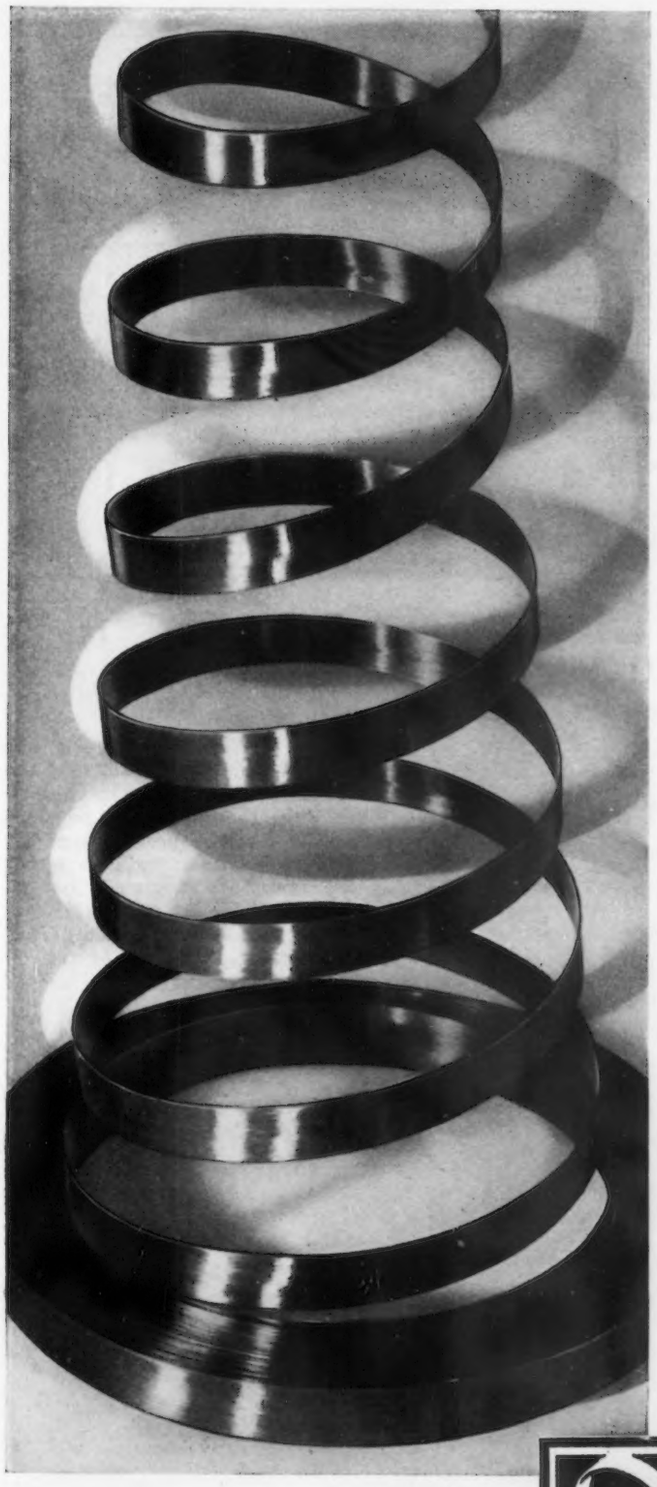
A fine example *of Uniformity* in flat wire



USED for a service in which unfailing dependability is essential, the flat wire shown is made to very rigid specifications. There can be no variation in its qualities.

This wire is characterized by strict uniformity of temper—a temper that is kept within exceptionally close limits. It is straight throughout and of unvarying thickness. It possesses great tensile strength, is highly flexible, and can be bent without fracturing.

An excellent example of our ability to meet exacting requirements, this cold-rolled high carbon steel flat wire is made in a variety of finishes. Included are black tempered; tempered and polished; and tempered, polished and colored.

Are you in the market for cold-rolled steel flat wire of high quality? If so, it would pay you to inspect samples of our work and to investigate our specialized experience of over 40 years and unrivaled facilities. We are particularly well-equipped to make high carbon "flats", and are also ideally set up to make low carbon flat wire.

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Wire · Wire Rope · Copper and Insulated Wires and Cables
Welding Wire · Flat Wire · Wire Cloth and Wire Netting
New York, Boston, Chicago, Philadelphia, Atlanta, Cleveland, Seattle, San Francisco, Los Angeles, Portland Export Dept., New York, N.Y.

ROEBLING FLAT WIRE

Ford's Experience with Rustless Steel

(*Concluded from page* 11)

painted. This part of the shop is glass inclosed. A down-draft spray hood is an interesting feature. The operators, usually one on each side, hold a shield over the caps so as to protect the V-8 emblem and spray the enamel paint on the caps as they pass over openings in an exhaust duct. For safety and cleanliness this part of the conveyor is kept covered with a removable coating. After a short air drying, a second coat is applied on another conveyor and the caps pass into an oven for an enamel baking operation.

There are many other applications of rustless steel in Ford products. Head lamp tie rods have a sheath of rustless steel for the bright area and are manufactured adjacent to the hub caps. They are washed in a similar chemical washer before the carbon steel ends are painted with enamel. This washer is such an efficient remover of grease that plain steel would quickly rust if not protected by paints or metallic coatings.

Windshield swing arm supports made of rustless steel do not weigh as much as those of carbon steel on account of their higher tensile and higher fatigue values. In the same manner rustless steel has proved an excellent material for hood hinges.

In addition to its uses for window channels on certain models and for running board moldings, rustless steel is employed for windshield hinge brackets on Lincoln cars because of its strength and non-rusting properties. Special care is taken to see that the color of the metal matches that of chrome plate used near it. Door dovetail covers also are of rustless steel.

Rustless steels in greater sections have been and are being used. Formerly Lincoln water pump shafts were of this general type of metal of about a 300 Brinell hardness. This also was true of radiator shutter pins, some carburetor parts and the first model A and the present V-eight pump shafts. Lincoln door lock bolts are of rustless steel of 30 to 40 hardness on the Rockwell C scale. Lincoln hinge pins of rustless steel of even this hardness were too soft and are now made of nitralloy, which is rustless in the hardened condition.

The main defects of rustless steel are too deep pickling, coarse-grained metal (referred to as open surface or grain), and fine seams which show up after polishing. In general, however, we can say that rustless steels have given satisfactory results in service and that their fabrication has been worked out successfully.

Housings of New Large Sheet Mill

(*Concluded from page* 15)

sources of supply and kinds of material available, we ultimately arrived at a design that is better in every respect and far more pleasing to the eye than standard mill designs that use castings," said Mr. Jones.

"Welded construction in machine design is sufficiently well advanced to demonstrate that it is practical and economical," he stated. "Concerns that adopt it even at the sacrifice of stock patterns, will ultimately benefit by the lower costs and increased sales.

"In changing from castings to welded steel, the functions of the machine must be analyzed carefully, and the engineer should have vision and courage.

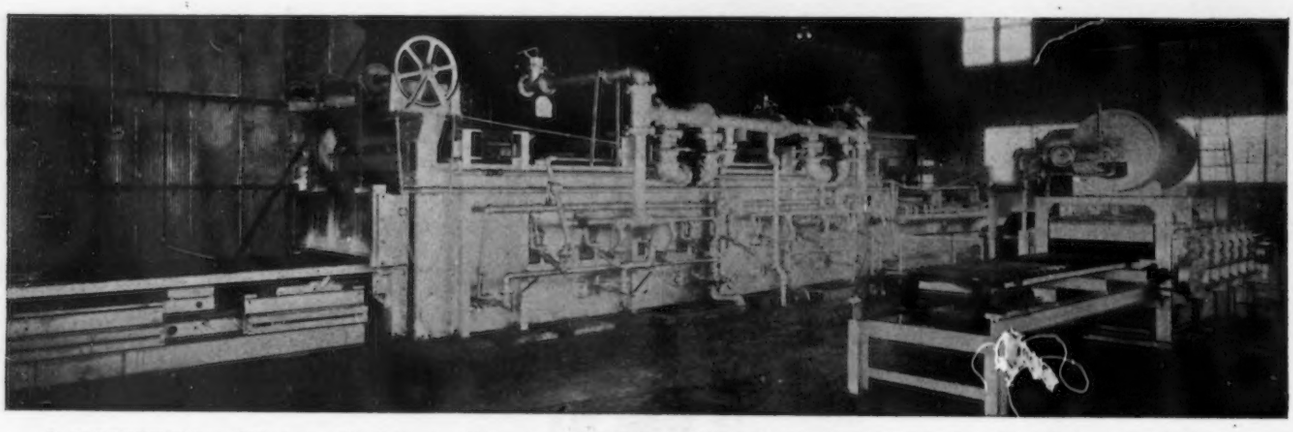
"Pleasing appearance, combined with practical construction, is, in my judgment, more readily obtainable by the combined use of rolled and forged steel than with castings alone. Simplicity of appearance, with simplicity of design, is true engineering.

"In the manufacture of machines on a quantity production basis, I believe that welded steel construction will prove ultimately cheaper and better, notwithstanding the argument regarding patterns, etc. What quantity production needs, is proper facilities for this new type of construction, that is, use of presses, forming machines, torch cutting devices, etc. Automobile frames, bodies, refrigerators, gas stoves, electric motors, etc., are excellent examples of what can be accomplished in multiple production and the machine tool manufacturer can learn much from their methods."

Open-Side Pipe Vises

NEW open-side pipe vises, made in three sizes, have been announced by the Toledo Pipe Threading Machine Co., Toledo, Ohio. The smallest, the No. 00, has capacity for ⅛-1½-in. pipe and the largest, the No. 3, has capacity for ⅛-4½-in. pipe.

Heavy frame, and full overlapping vise jaws made from tool steel and hardened are features emphasized. When dull, the jaws may be easily replaced. Handles are of large size and are made long to facilitate setting of the jaws. It is stated that the vises are suitable for fitting make-up work, as the jaw construction permits working close to the face of the vise and will hold copper as well as iron or steel pipe.



A CONTINUOUS walking beam tin plate normalizing furnace and dryer at the Washington Tin Plate Co., Washington, Pa. The furnace is 40 ft. long and has a capacity of 35 tons of tin plate a day. The dryer is a separate unit and is equipped with an air heater to dry the sheets after pickling. Natural gas is used as fuel for both the normalizing furnace and the dryer. The equipment was furnished by the Surface Combustion Corpn.

Engin.
rary

NTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

JUL 21 1933

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THE IRON AGE

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ALL THE WAY

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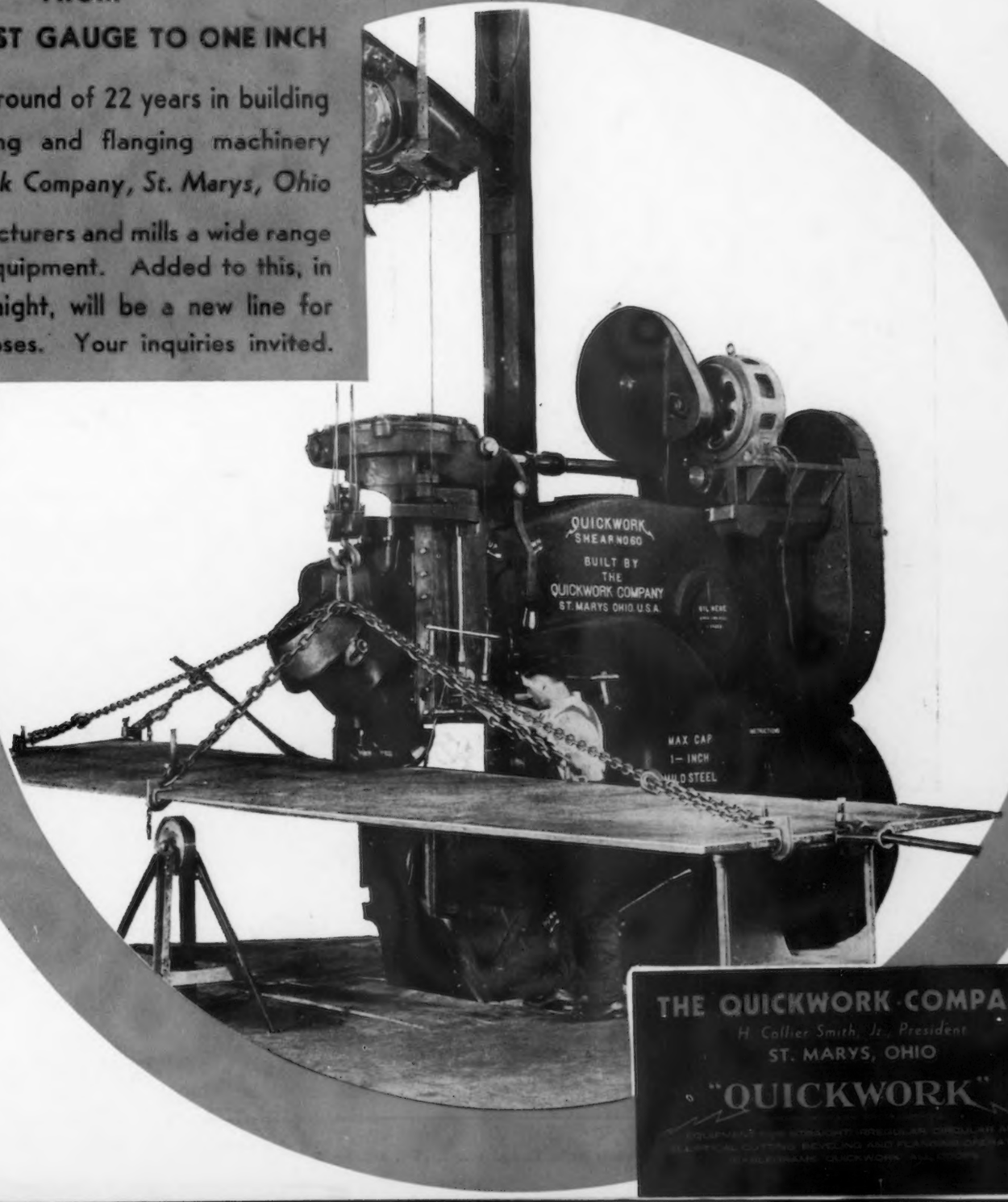

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FOR practically all steel applications out-of-doors, and for numerous indoor uses, Inland Copper-Alloy steel deserves preference. For it is the answer wherever there is moist air. Unbiased tests prove that copper-bearing steel resists corrosion longer than ordinary steel or iron.

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PROOF

Iron and steel sheets have been ranked according to rust and corrosion resistance under atmospheric conditions by the American Society for Testing Materials, ranking based on tests at Fort Sheridan, Annapolis and Pittsburgh. Copper-bearing steel sheets lead the list.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Strip Plates
Bands Structurals Piling

Rails Track Accessories
Bars Rivets Billets

The Center of the STORM

THE recent disaster of the Akron has reminded most of us of some elementary meteorology that we probably learned before we reached the eleventh grade and quite possibly forgot before we left the twelfth.

The elementary facts referred to are the conditions existing at the center of a storm.

We are reminded that in such an area the currents are of unpredictable violence and direction, and that their behavior—as far as known—is indescribable even in very general terms. The currents may have streams of high and sudden velocity, and may have eddies or areas of relative or perhaps absolute calm; may vary in direction not only according to compass directions, but also in the third dimension; may be one thing at one point and something the exact opposite a mere hundred yards away.

Evidently, in business, we are just getting out of the center of the storm that burst with such dramatic crashes of thunder back in 1929.

For the business wind, it seems, is blowing in all directions at once. There are confusing cross-currents and eddies. Hopeful areas are mingled with areas still tempest-tossed.

It is all very upsetting, of course—especially for those of us who have formed the bad habit of generalizing upon a set of existing circumstances. With meteorological conditions so scrambled, it is no longer safe to make sweeping pronouncements about the weather while sitting indoors.

There is a great deal of encouragement in this, because if there is anything that we need to get rid of today, it is the vice of generalizing.

Many of us fell into that vice in the days when the clouds were thickening and the storm was growing in force. Because events all appeared to have one trend, one direction, it was easy to make broad statements and to arrive at wide conclusions.

Thus there came into being the easy and comfortable practice of treating everything alike; of expecting everything to follow a straight downward course, and of inferring the whole from the part.

It was an easy practice because it did not demand any active intelligence or effort, and it was a comfortable practice because it furnished such excellent reasons for doing nothing.

But the pattern has broken up. Those who keep on generalizing are likely to do themselves an injury.

This is the worst of all possible times to treat everything alike, since things are not affected equally. It is certainly not the time to delay business-getting action.

More and more it is apparent that markets are an *aggregation* of units, not a single unit, and that these units are subject to individual—and often contrary—movements, refusing to follow an orderly and uniform plan of recovery.

The mind that has grown grooved from too much generalizing must become supple and alert if it is to deal effectively and profitably with things as they are. A sharp and unprejudiced eye is needed to search out the areas of convalescence. A quick and flexible hand is needed to grasp opportunity as it arises.

It is the business of successful industrial advertising and promotion to aid both the eye and the hand.

Such advertising and promotion can *locate* business more quickly and more economically than any other means—for that has always been one of their primary functions. In a complex situation, they supply the most *flexible* method of picking out favorable regions and markets and getting something out of them. In most cases they can do these things without requiring any elaborate set-up, or any extensive enlargement of the existing selling structure.

Now is the time to get ready to use them.

[*Courtesy of* THE BUCHEN COMPANY, *Chicago.*]